

HP 9000 rp7420 Server User Service Guide

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About This Document

This document provides information, installation procedures, and server specifications for the HP 9000 rp7420 server. It also provides parts information and describes how to remove and replace server components, troubleshoot, and diagnose server problems.

The document printing date and part number indicate the document's current edition. The printing date changes when a new edition is printed. Minor changes may be made at reprint without changing the printing date. The document part number changes when extensive changes are made.

Document updates may be issued between editions to correct errors or document product changes. To ensure that you receive the updated or new editions, you should subscribe to the appropriate product support service. See your HP sales representative for details.

The latest version of this document can be found online at: <http://docs.hp.com/en/hw.html> under Enterprise Servers, Workstations, Systems Hardware.

Intended Audience

This document is intended to provide technical product and support information for authorized service providers, customer system administrators, and HP support personnel.

This document is not a tutorial.

New and Changed Information in This Edition

This document has been updated into a new format for greater usability.

Publishing History

The publishing history below identifies the edition dates of this manual. Updates are made to this publication on an unscheduled, *as needed*, basis. The updates will consist of a complete replacement manual and pertinent online or CD documentation.

Table 1 Publishing History Details

Document Manufacturing Part Number	Operating Systems Supported	Supported Product Versions	Publication Date
A7027-96005	• HP-UX	rp7420	December 2003
A7025-96011	• HP-UX	rp7420	June 2004
A7025-96017	• HP-UX	rp7420	October 2006
A7025-96023	• HP-UX	rp7420	May 2007
A7025-96023-ed5	• HP-UX	rp7420	July 2009

Document Organization

This guide is divided into the following chapters and appendices.

- Chapter 1 **Overview** Use this chapter to learn about the features and components of the HP Integrity rp7420 server.
- Chapter 2 **Unpacking the Server** Use this chapter to learn about how to unpack the server from its shipping packaging.
- Chapter 3 **Installing Accessories** Use this chapter to learn about installing accessories into the server.

Chapter 4	Cabling and Powering the Server Use this chapter to learn how to attach the cabling to the server, and how to perform the initial start up of the server.
Chapter 5	Troubleshooting Use this chapter to learn about troubleshooting problems you may encounter with the server.
Chapter 6	Removing and Replacing Server Components Use this chapter to learn how to remove and replace the various server components.
Appendix A	Parts Information Use this appendix to learn the part numbers of the server components.
Appendix B	System Specifications Use this appendix for information regarding the utilities available for the server.
Appendix C	MP Commands Use this appendix for information regarding the MP commands available for the server.
Appendix D	Site Preparation Guide Use this appendix for the environmental requirements for installing the server in a data center.

Typographic Conventions

This document uses the following conventions.



WARNING! A warning lists requirements that you must meet to avoid personal injury.



CAUTION: A caution provides information required to avoid losing data or avoid losing server functionality.



NOTE: A note highlights useful information such as restrictions, recommendations, or important details about HP product features.

<i>Book Title</i>	The title of a book. On the Web and on the Instant Information CD, it may be a hot link to the book itself.
KeyCap	The name of a keyboard key or graphical interface item (such as buttons, tabs, and menu items). Note that Return and Enter both refer to the same key.
<i>Emphasis</i>	Text that is emphasized.
Bold	Text that is strongly emphasized.
Bold	The defined use of an important word or phrase.
ComputerOut	Text displayed by the computer.
UserInput	Commands and other text that you type.
Command	A command name or qualified command phrase.
Option	An available option.
Screen Output	Example of computer screen output.
[]	The contents are optional in formats and command descriptions. If the contents are a list separated by , you must select one of the items.
{ }	The contents are required in formats and command descriptions. If the contents are a list separated by , you must select one of the items.
...	The preceding element may be repeated an arbitrary number of times.
	Separates items in a list of choices.

HP-UX Release Name and Release Identifier

Each HP-UX 11i release has an associated release name and release identifier. The `uname(1)` command with the `-r` option returns the release identifier. Table 2 (page 15) shows the releases available for the rp7420 server.

Table 2 HP-UX 11i Releases

Release Identifier	Release Name	Supported Processor Architecture
B.11.31	HP-UX 11i v 3.0	Intel Itanium

Related Documents

You can find other information on HP server hardware management and diagnostic support tools in the following publications.

Web Site for HP Technical Documentation: <http://docs.hp.com/en/hw.html>

Server Hardware Information: <http://docs.hp.com/en/hw.html>

Windows Operating System Information You can find information about administration of the Microsoft Windows operating system at the following Web sites, among others:

- http://docs.hp.com/windows_nt/
- <http://www.microsoft.com/technet/>

Diagnostics and Event Monitoring: Hardware Support Tools Complete information about HP's hardware support tools, including online and offline diagnostics and event monitoring tools, is at the <http://docs.hp.com/hpux/diag/> Web site. This site has manuals, tutorials, FAQs, and other reference material.

Web Site for HP Technical Support: <http://us-support2.external.hp.com/>

Books about HP-UX Published by Prentice Hall The <http://www.hp.com/hpbooks/> Web site lists the HP books that Prentice Hall currently publishes, such as the following HP-UX books:

- *HP-UX 11i System Administration Handbook*
http://www.hp.com/hpbooks/prentice/ptr_0130600814.html
- *HP-UX Virtual Partitions*
http://www.hp.com/hpbooks/prentice/ptr_0130352128.html

HP Books are available worldwide through bookstores, online booksellers, and office and computer stores.

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Please send comments to: netinfo_feedback@cup.hp.com.

Please include title, manufacturing part number, and any comment, error found, or suggestion for improvement you have concerning this document. Also, please include what we did right so we can incorporate it into other documents.

1 Overview

The HP 9000 rp7420 server is a member of the HP business-critical computing platform family. It is a mid-range, mid-volume server, positioned as an upgrade to the HP 9000 rp7410 server in the PL-1X product line. The HP 9000 rp7420 server shares the same hardware as the HP 9000 rp7410 server with changes to the cell board, CPU modules, core I/O, and the PCI-X backplane. The HP 9000 rp7420 server provides increased performance over its predecessor.

Introduction

The HP 9000 rp7420 server is a 10U, 8-socket symmetric multi-processing, rack-mounted server that accommodates up to 64 GB of memory; PCI-X I/O, and internal peripherals, including disks and DVD/tape. Its high availability features include N+1 hot-pluggable fans and power, redundant power cords, and hot-pluggable PCI-X cards and internal disks. It currently uses dual core, PA-RISC processors.

Figure 1-1 HP 9000 rp7420 server (front view)

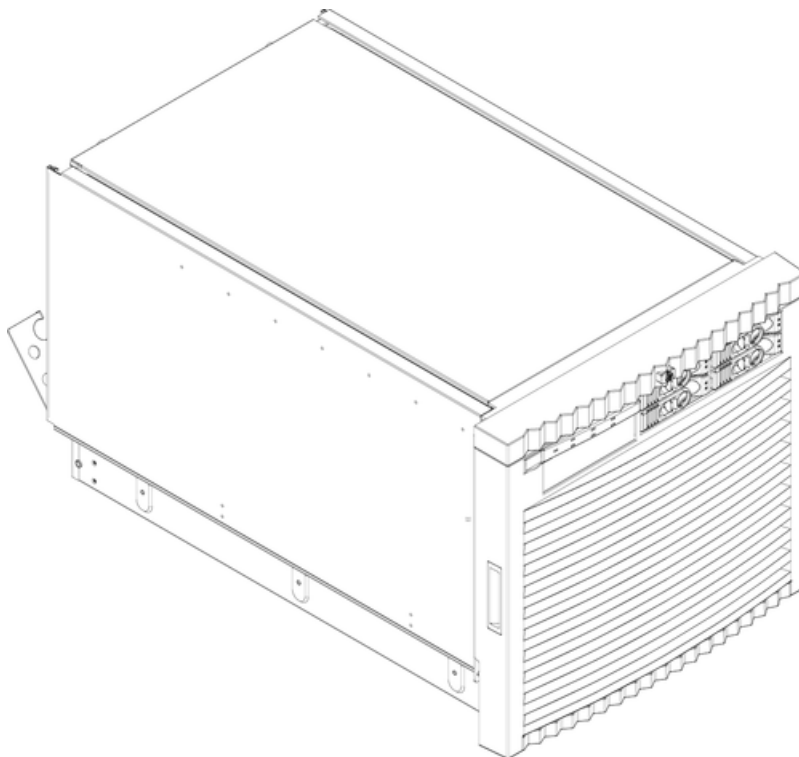
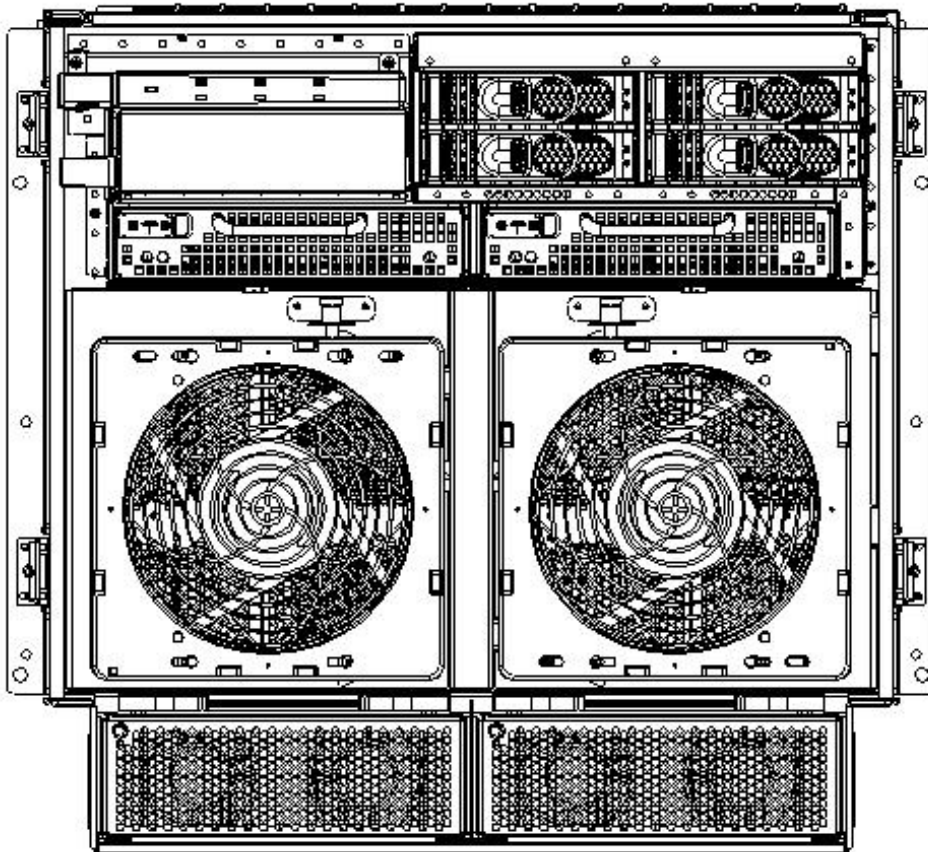


Figure 1-2 HP 9000 rp7420 server (without front bezel)

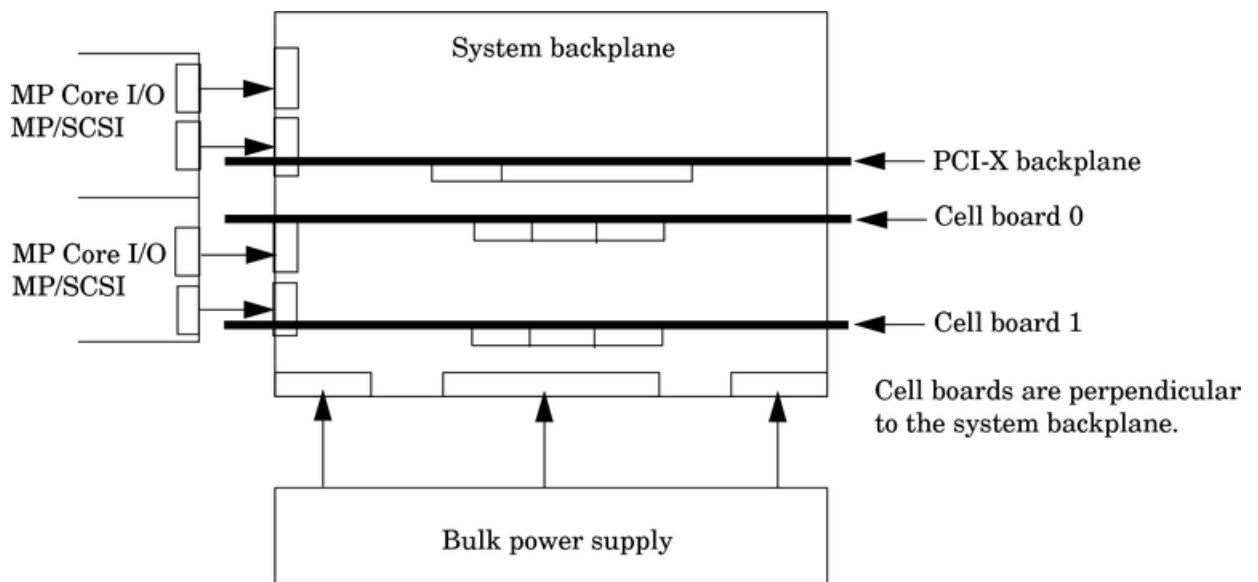


System Backplane

The system backplane is comprised of the system clock generation logic, the system reset generation logic, DC-to-DC converters, power monitor logic, and two Local Bus Adapter (LBA) link-to-PCI converter ASICs. It also includes connectors for attaching the cell boards, the PCI-X backplane, Management Processor (MP) Core I/O MP/SCSI boards, SCSI cables, bulk power, chassis fans, the front panel display, intrusion switches, and the system scan card. Unlike the Superdome or rp8400 servers, there are no Crossbar Chips (XBC) on the system backplane. The "crossbar-less" back-to-back Cell Controller (CC) connection increases performance and reduces costs.

Only half of the MP Core I/O board set connects to the system backplane. The MP/SCSI boards plug into the backplane, while the LAN/SCSI boards plug into the PCI-X backplane.

Figure 1-3 System Backplane Block Diagram



System Backplane to PCI-X Backplane Connectivity

The PCI-X backplane uses two connectors for the System Bus Adapter (SBA) link bus and two connectors for the high speed data signals and the manageability signals.

SBA link bus signals are routed through the system backplane to the CC on each corresponding cell board.

The high speed data signals are routed from the SBA chips on the PCI-X backplane to the two LBA PCI bus controllers on the system backplane.

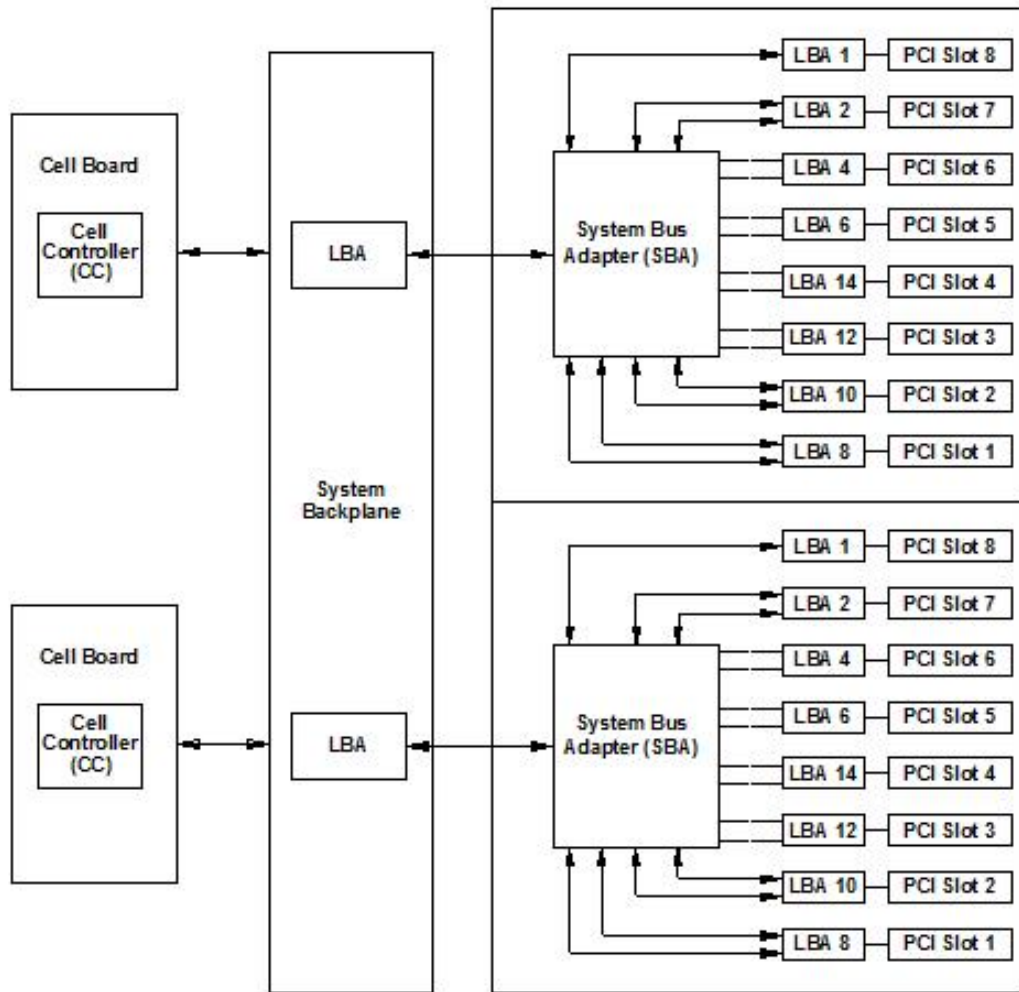
Clocks and Reset

The system backplane contains reset and clock circuitry that propagates through the whole system. The central clocks drive all major chip set clocks. Therefore, these circuits represent a system-wide single point of failure.

I/O Subsystem

The cell board to the PCI-X board path runs from the CC to the SBA, from the SBA to the ropes, from the ropes to the LBA, and from the LBA to the PCI slots seen in Figure 1-4. The CC on cell board 0 and cell board 1 each communicate with individual SBAs over the SBA link. The SBA link consists of both an inbound and an outbound link with an effective bandwidth of approximately 1 GB/sec. The SBA converts the SBA link protocol into "ropes." A rope is defined as a high-speed, point-to-point data bus. The SBA can support up to 16 of these high-speed bi-directional rope links for a total aggregate bandwidth of approximately 4 GB/sec. Each LBA acts as a bus bridge, supporting either one or two ropes and capable of driving 33 Mhz or 66 Mhz for PCI cards. The LBAs can also drive at 66 Mhz or 133 Mhz for PCI-X cards.

Figure 1-4 PCI-X Board to Cell Board Block Diagram



NOTE: PCI-X slots 1 through 7 are dual rope slots, while slot 8 is a single rope slot.

The PCI-X backplane is the primary I/O interface for HP 9000 rp7420 servers. It provides sixteen 64-bit, hot-plug PCI/PCI-X slots. Fourteen of the slots have dual ropes connected to the LBA chips. The remaining two slots have a single rope connected to each LBA chip. Each of the sixteen slots are capable of 66 MHz/33 MHz PCI or 133 MHz/66 MHz PCI-X. All sixteen PCI slots are keyed for 3.3-volt connectors (accepting both Universal and 3.3-V cards). The PCI-X backplane does not provide any 5-volt slots for the I/O cards. For more details, see Table 1-1.

The PCI-X backplane is physically one board but behaves like two independent partitions. SBA 0 and its associated LBAs and eight PCI-X slots form one I/O partition. SBA 1 and its associated LBAs and eight PCI-X slots form the other I/O partition. One I/O partition can be powered down separate from the other I/O partition.

Table 1-1 PCI-X Slot Types

I/O Partition	Slot	Device ¹
0	8	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, hot plug slot
0	7	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, hot plug slot
0	6	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, hot plug slot
0	5	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, hot plug slot

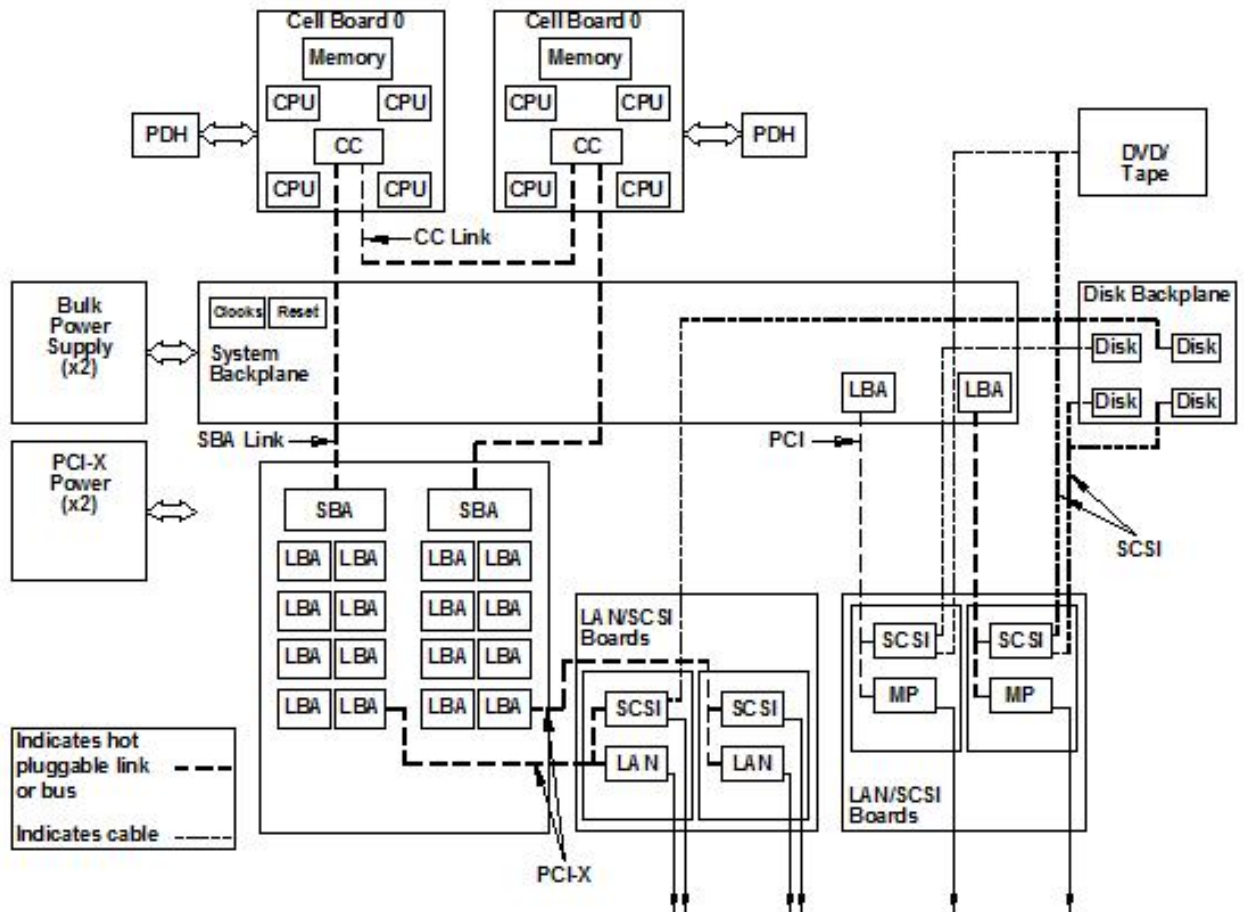
Table 1-1 PCI-X Slot Types (continued)

I/O Partition	Slot	Device ¹
0	4	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, hot plug slot
0	3	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, hot plug slot
0	2	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, hot plug slot
0	1	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, hot plug slot
1	8	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, hot plug slot
1	7	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, hot plug slot
1	6	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, hot plug slot
1	5	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, hot plug slot
1	4	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, hot plug slot
1	3	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, hot plug slot
1	2	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, hot plug slot
1	1	PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, hot plug slot

¹ If the slot is used as a PCI slot, either the 33 MHz or 66 MHz PCI frequency is supported. If the slot is used as a PCI-X slot, either the 66 MHz or 133 MHz PCI-X frequency is supported.

Detailed HP 9000 rp7420 Server Description

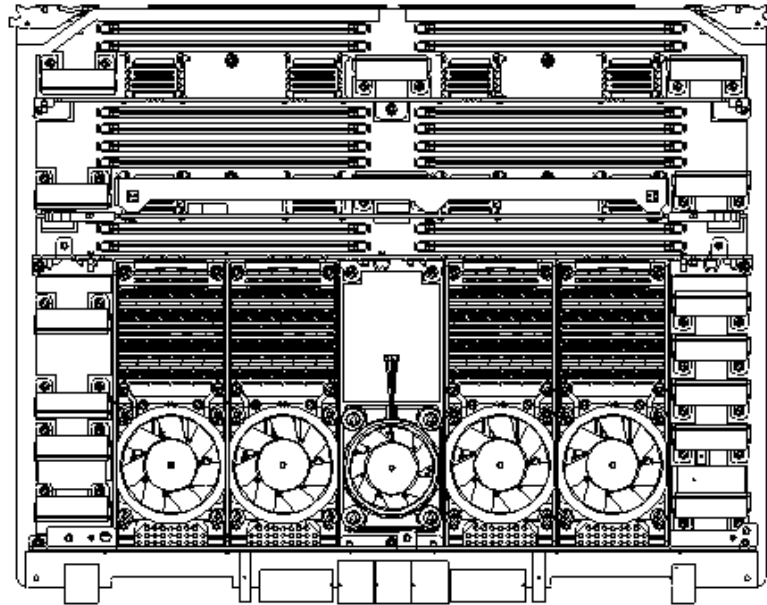
Figure 1-5 HP 9000 rp7420 server 8-Socket Block Diagram



Cell Board

The cell board contains several hardware blocks connected by several data buses. The major hardware blocks are the Central Processor Units (CPUs), the Cell Controller, the Memory Controllers, and the Memory. Minor hardware blocks include Clock Distribution, Power Distribution, Reset Circuit, and Platform Dependent Hardware (PDH) Riser Board Interface. The buses include two Front Side Buses (FBS0 and FBS1), a Memory (MID) bus, a Crossbar (XB) bus, and an I/O bus. All these blocks come together at the CC chip.

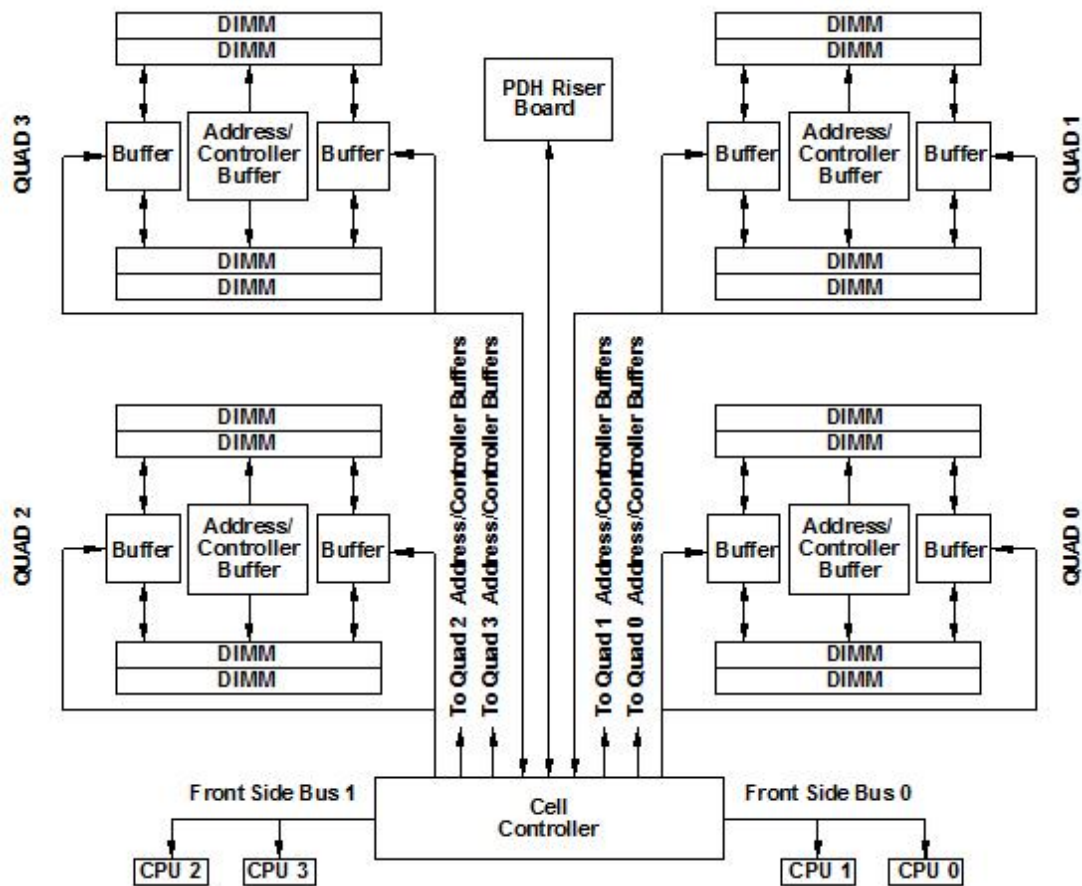
Figure 1-6 Cell Board



The HP 9000 rp7420 server has a 48-V distributed power system and receives the 48-V power from the system backplane board. The cell board contains DC-to-DC converters to generate the required voltage rails. The DC-to-DC converters on the cell board do not provide N+1 redundancy. Because of space limitations on the cell board, the PDH/PDHC circuitry resides on a riser board that plugs into the cell board at a right angle. The cell board also includes clock circuits, test circuits, and de-coupling capacitors.

Figure 1-7 shows a simplified view of the memory subsystem. It consists of two independent access paths, each path having its own address bus, control bus, data bus, and DIMMs. In practice, the CC runs the two paths 180 degrees out of phase with respect to each other to facilitate pipelining in the CC. Address and control signals are fanned out through register ports to the synchronous dynamic random access memory (SDRAM) on the DIMMs.

Figure 1-7 Memory Subsystem



PDH Riser Board

The Platform Dependant Hardware Riser board is a daughter card for the cell board. It contains a micro-processor memory interface microcircuit, processor-dependent hardware including the processor-dependent code (PDC), flash memory, and a manageability microcontroller, called the Platform Dependant Hardware Controller (PDHC) with associated circuitry. The PDH obtains cell board configuration information from cell board signals and from the LPM on the cell.

The PDH riser board contains circuitry that the cell board requires to function and, therefore, each cell board must have a PDH riser installed before it is added to a server.

Central Processor Units

The cell board can hold up to eight (four dual-core) CPUs and can be populated with CPUs in increments of two CPUs. On a cell board, the processors must be the same type and speed. Two CPUs is the minimum configuration allowed on the HP 9000 rp7420 server. There are two Frontside Buses (FBS), one for sockets 0 and 1, and one for sockets 2 and 3. Each FBS must have either a CPU or a terminator at the end of the bus or the board does not operate properly. There cannot be a terminator board in socket 1 or socket 3 locations. For the CPU load order that must be maintained when adding CPUs to the cell board, see Table 1-2. For the locations on the cell board for installing CPUs, see Figure 1-8.

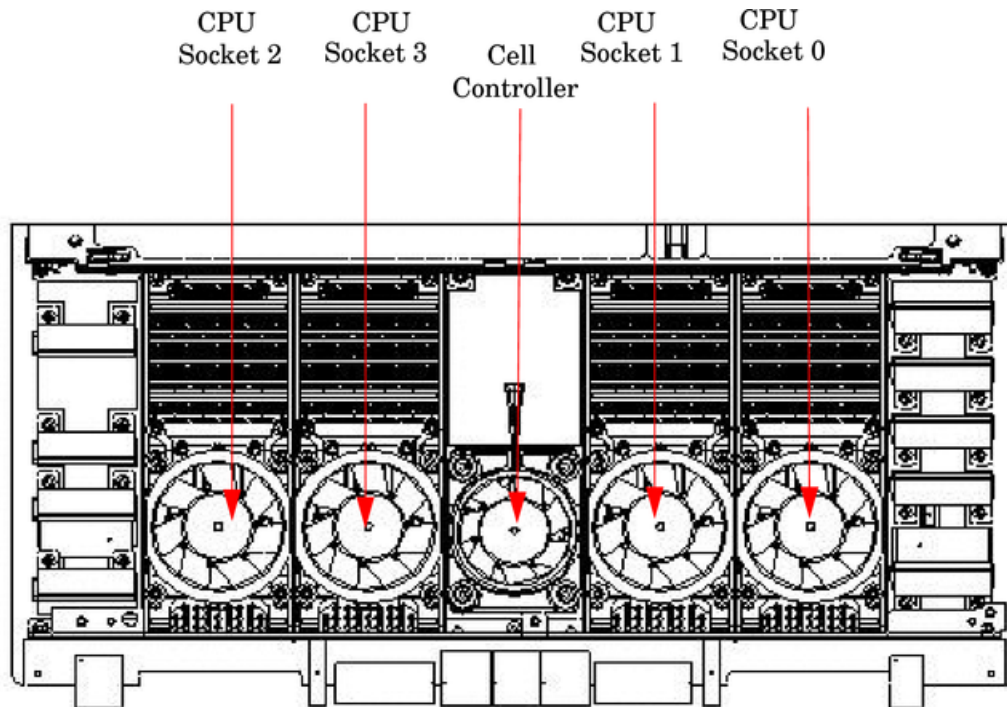
Table 1-2 Cell Board CPU Load Order

Number of CPUs Installed	Socket 0 Location	Socket 1 Location	Socket 2 Location	Socket 3 Location
Two	CPU installed	Empty slot	Terminator	Empty
Four	CPU installed	Empty slot	CPU installed	Empty

Table 1-2 Cell Board CPU Load Order (continued)

Number of CPUs Installed	Socket 0 Location	Socket 1 Location	Socket 2 Location	Socket 3 Location
Six	CPU installed	CPU or empty	CPU installed	Empty or CPU
Eight	CPU installed	CPU installed	CPU installed	CPU installed

Figure 1-8 CPU Locations on Cell Board



DIMMs

Custom designed by HP, each DIMM contains 36 x 4 SDRAM memory components similar to PC-133 memory, but qualified to run at 125 MHz. They have a low-voltage TTL interface. The CEC does *not* support traditional DRAMs.

The HP 9000 rp7420 server supports DIMMs with 256 MB, 512 MB, 1 GB, and 2 GB capacity. Table 1-3 shows each DIMM supported with its associated capacity, the resulting total system capacity, and the memory component density.

DIMMs must be loaded in sets of two at specific locations. For best performance, HP recommends loading sets of eight DIMMs.

Table 1-3 HP 9000 rp7420 server DIMMs

DIMM Capacity	Total Capacity	Memory Component Density
256 MB	8 GB	32 Mb
512 MB	16 GB	64 Mb
1 GB	32 GB	128 Mb
2 GB	64 GB	256 Mb
4 GB	128 GB	512 Mb

Main Memory Performance

Latency to main memory is an important parameter in determining overall system performance. With memory buses running at 125 MHz, the latency for a page hit is 8.5 cycles (68 ns), the latency for a page closed is 11.5 cycles (92 ns), and the latency for a page miss is 14.5 cycles (116 ns).

Valid Memory Configurations

The HP 9000 rp7420 server is capable of supporting as little as 0.5 GB of main memory using two 256 MB DIMMs installed on a single cell board and as much as 128 GB by filling all 16 DIMM slots on both cell boards with 4 GB DIMMs.

DIMMs must be loaded in sets of two at specified locations on the cell board. Two DIMMs are called a rank; two ranks would be equivalent to four DIMMs, three ranks would be six DIMMs, and so on. The DIMMs must be the same size in a rank. The DIMMs across all cells in a partition should have identical memory loaded. Figure 1-9 shows the DIMM slot layout on the cell board. For DIMM load order, see Table 1-4.

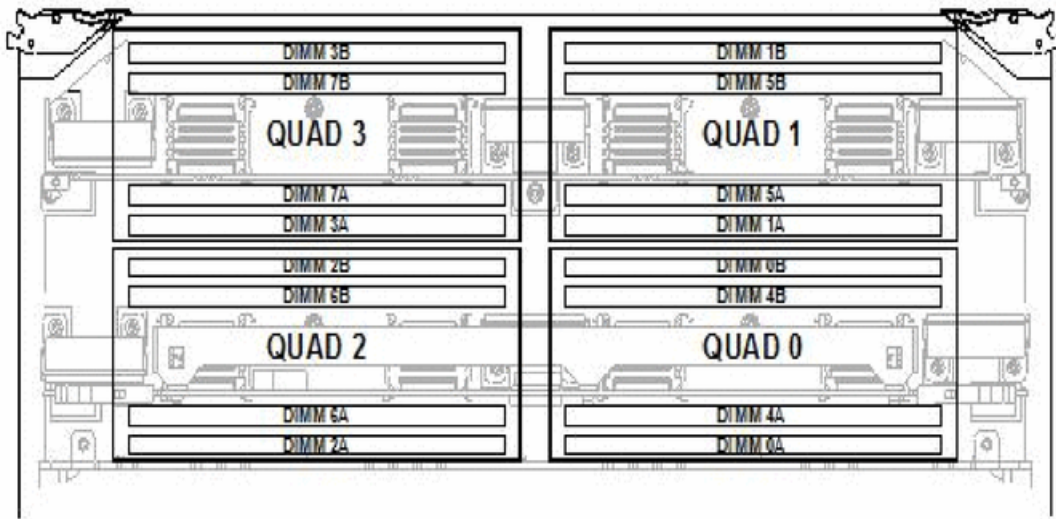
A quad seen in Figure 1-9 is a grouping of four DIMMs. Configurations with 8 or 16 DIMM slots loaded are recommended. The DIMM sizes in a quad can be different but the DIMMs in a rank must be the same size.

Table 1-4 DIMM Load Order

Number of DIMMs Installed	Action Taken	DIMM Location on Cell Board	Quad Location
2 DIMMs = 1 Rank	Install First	0A and 0B	Quad 0
4 DIMMs = 2 Ranks	Add Second	1A and 1B	Quad 1
6 DIMMs = 3 Ranks	Add Third	2A and 2B	Quad 2
8 DIMMs = 4 Ranks	Add Fourth	3A and 3B	Quad 3
10 DIMMs = 5 Ranks	Add Fifth	4A and 4B	Quad 0
12 DIMMs = 6 Ranks	Add Sixth	5A and 5B	Quad 1
14 DIMMs = 7 Ranks	Add Seventh	6A and 6B	Quad 2
16 DIMMs = 8 Ranks	Add Last	7A and 7B	Quad 3

Figure 1-9 DIMM Slot Layout

Front Edge of Cell Board



Rear Edge of Cell Board
(Plugs into the System Backplane)

Cells and nPartitions

A cell board that has an I/O link to a bootable device and a console (usually supplied by an MP core I/O card) is a potential boot cell. The cell that contains the boot console I/O path is called the root cell. Both cells are potential root cells. The primary or default root cell in a single nPartition system is the bottom cell (cell 1).

An nPartition (also called a Protection Domain) is a cell or cells running the same operating system and sharing processes and memory space among the components. Each nPartition must have one root cell and can contain both cells. The HP 9000 rp7420 server has only two possible nPartition configurations: single or dual. The additional cell that can be part of the nPartition does not require I/O links or MP core I/O cards.

In the single nPartition case, if two cells are present, either cell can be the root cell, assuming both cells have MP core I/O functionality present. If only one cell is present, that cell is the root cell (and should be cell 1).

In the dual nPartition case (two cells required), each nPartition consists of one cell, and each cell must be a root cell. The ability to interconnect two cells in one nPartition or isolate the cells in a dual nPartition system provides system configuration flexibility. System partitioning is configured by the system MP.



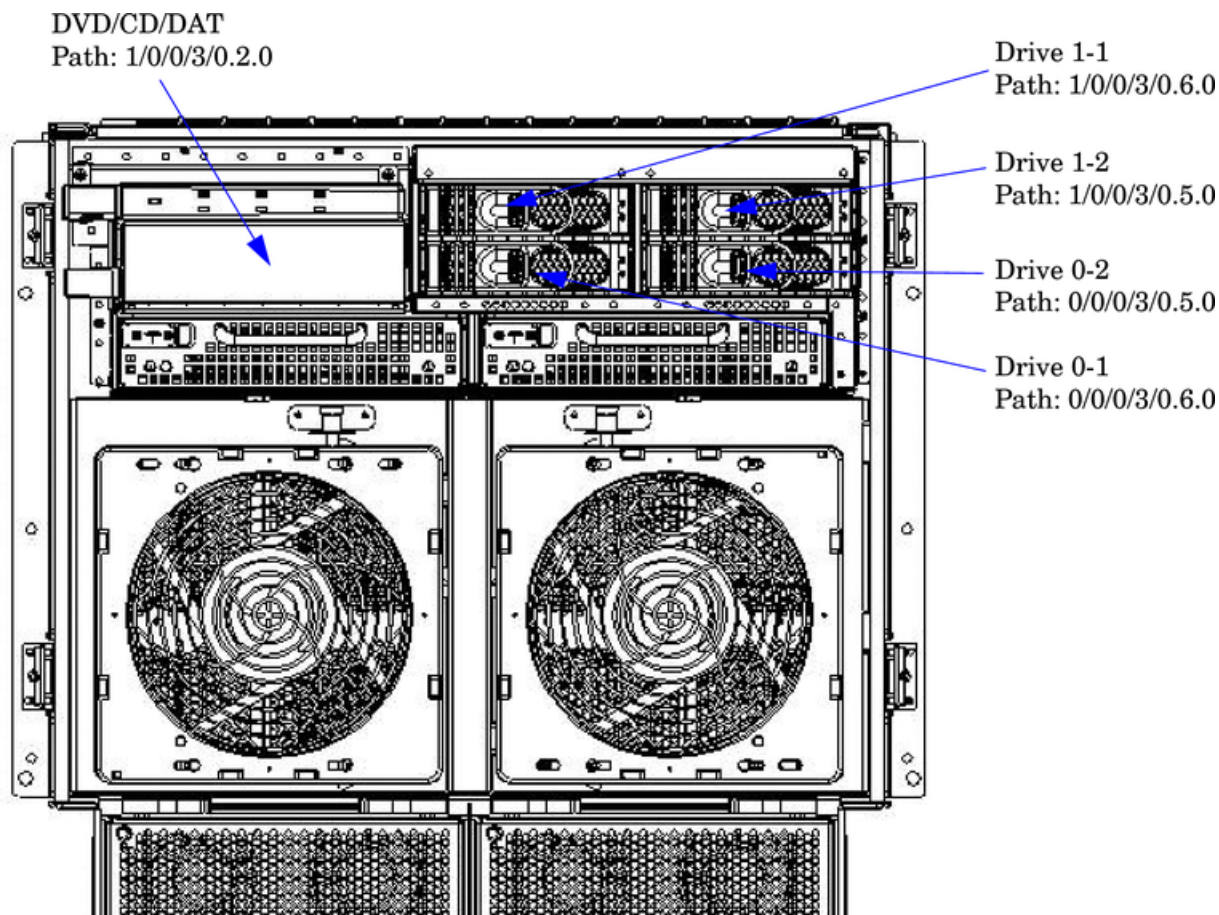
NOTE: Partition configuration information is available on the HP website at <http://docs.hp.com>. For more detail, see the HP Systems Partition Guide: Administration for nPartitions.

Internal Disk Devices for the HP 9000 rp7420 server

In an HP 9000 rp7420 server, the top internal disk drives connect to cell 1 through the core I/O for cell 1. Both of the bottom disk drives connect to cell 0 through the core I/O for cell 0.

The CD/DVD/DAT drive connects to cell 1 through the core I/O card for cell 1.

Figure 1-10 Internal Disks



MP/SCSI MP Core I/O Board

The HP 9000 rp7420 server accommodates two sets of MP Core I/O functionality. Each MP/SCSI core I/O board set consists of a MP/SCSI board and a Procurium LAN/SCSI board. At least one MP/SCSI board is required (independent of partitions). An additional MP/SCSI board can be added as well (and is required in a dual partition system). Both MP/SCSI boards are oriented vertically and plug into the system backplane. The MP/SCSI board incorporates a dual channel Ultra160 SCSI controller.

Procurium LAN/SCSI Board

At least one Procurium LAN/SCSI board is required for the minimum system configuration; two are required in a dual partition system. The Procurium board is a standard PCI form factor card with PCI card edge connectors. The PCI-X backplane has one slot location reserved for the required Procurium board and another that can accommodate either a Procurium board or any other supported add-in PCI-X card. The Procurium board is hot-pluggable.

Mass Storage (Disk) Backplane

Internal mass storage connections (to disks) are routed on the mass storage backplane, having connectors and termination circuitry. All disks are hot-pluggable. The HP 9000 rp7420 server accommodates one internal, removable media device. Therefore, only one power connector for a removable media device is required on the mass storage backplane. The mass storage backplane incorporates a circuit that enables power to the internal removable media device to be programmatically cycled.

Server Description

Dimensions

The dimensions of the HP 9000 rp7420 server are as follows:

- Width: 44.45 cm (17.5 inches), constrained by EIA standard 19 inch racks
- Depth: Defined by cable management constraints to fit into standard 36-inch deep racks (Rittal/Compaq, Rosebowl I):
 - 25.5 inches from front rack column to PCI connector surface
 - 26.7 inches from front rack column to MP Core I/O connector surface
 - 30 inches overall package dimension, including 2.7 inches protruding in front of the front rack columns
- Height: $10U - 0.54 \text{ cm} = 43.91 \text{ cm}$ (17.287 inches). This is the appropriate height for a product that consumes 10U of rack height while allowing adequate clearance between products directly above and below this product. Fitting four server units per 2 m rack and upgrade of current 10U height products in the future are the main height constraints.

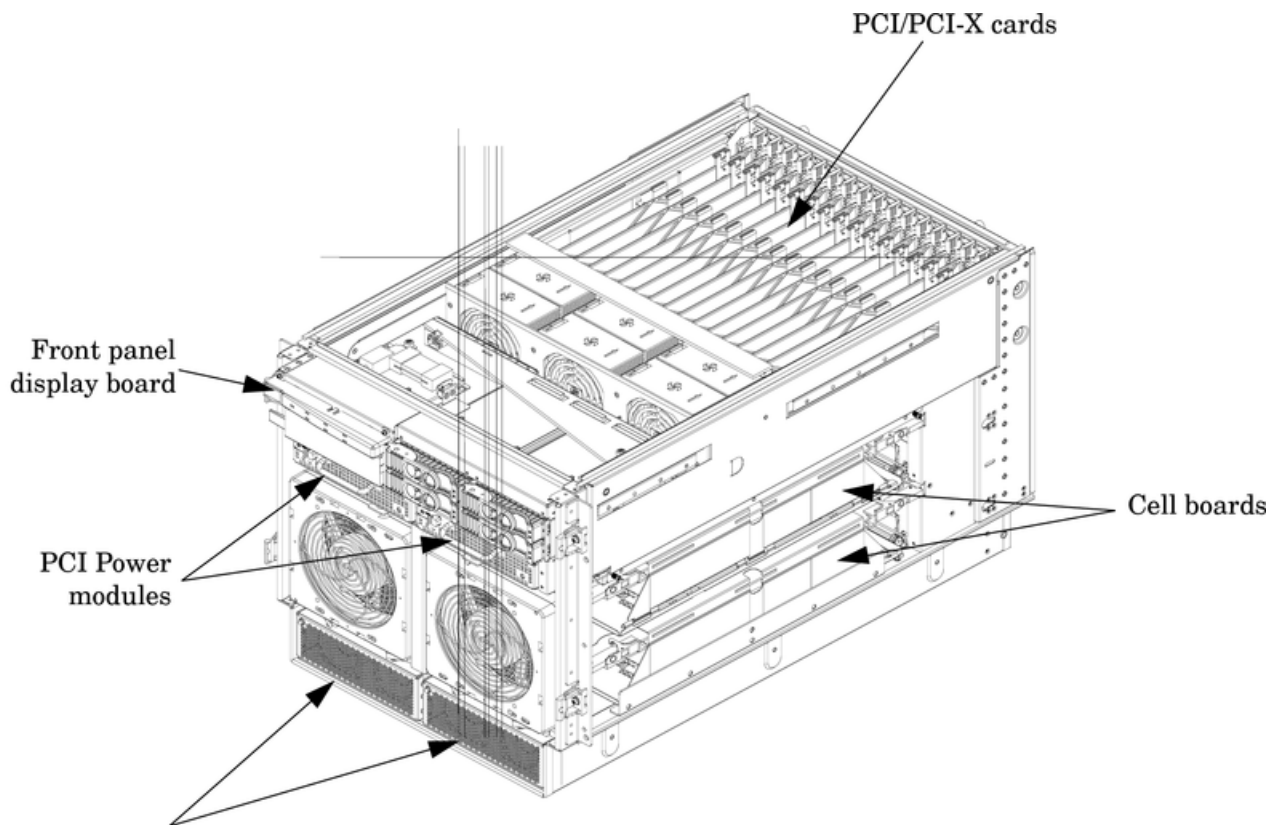
System Chassis

The mass storage section located in the front enables access to removable mass storage devices without removal of the bezel (not shown). This is especially helpful when the system is mounted in the lowest position in a rack. The mass storage bay accommodates one 5.25-inch removable media device and up to four 3.5-inch hard drives. The front panel display board, containing LEDs and the system power switch, is located directly above the 5.25-inch removable media bay.

Below the mass storage section and behind a removable bezel are two PCI DC-to-DC power converters.

The BPS section is partitioned by a sealed metallic enclosure located in the bottom of the package. This enclosure houses the N+1 fully redundant BPS.

Figure 1-11 Right-Front View of HP 9000 rp7420 server



Bulk powers supplies

The PCI-X card section, located toward the rear, is accessed by removing the top cover.

The PCI OLR fan modules are located in front of the PCI-X cards. These six 9.2-cm fans are housed in plastic carriers. They are configured in two rows of three fans.

The MP/SCSI MP core I/O boards are positioned vertically at the rear of the chassis.

The PCI-X card bulkhead connectors are located in the top rear portion of the chassis.

Four OLR system fan modules, externally attached to the chassis, are 15-cm (6.5-inch) fans. Two fans are mounted on the front surface of the chassis and two are mounted on the rear surface. The two hot-pluggable N+1 redundant BPS provide a wide input voltage range. They are installed in the front of the chassis, directly under the front fans.

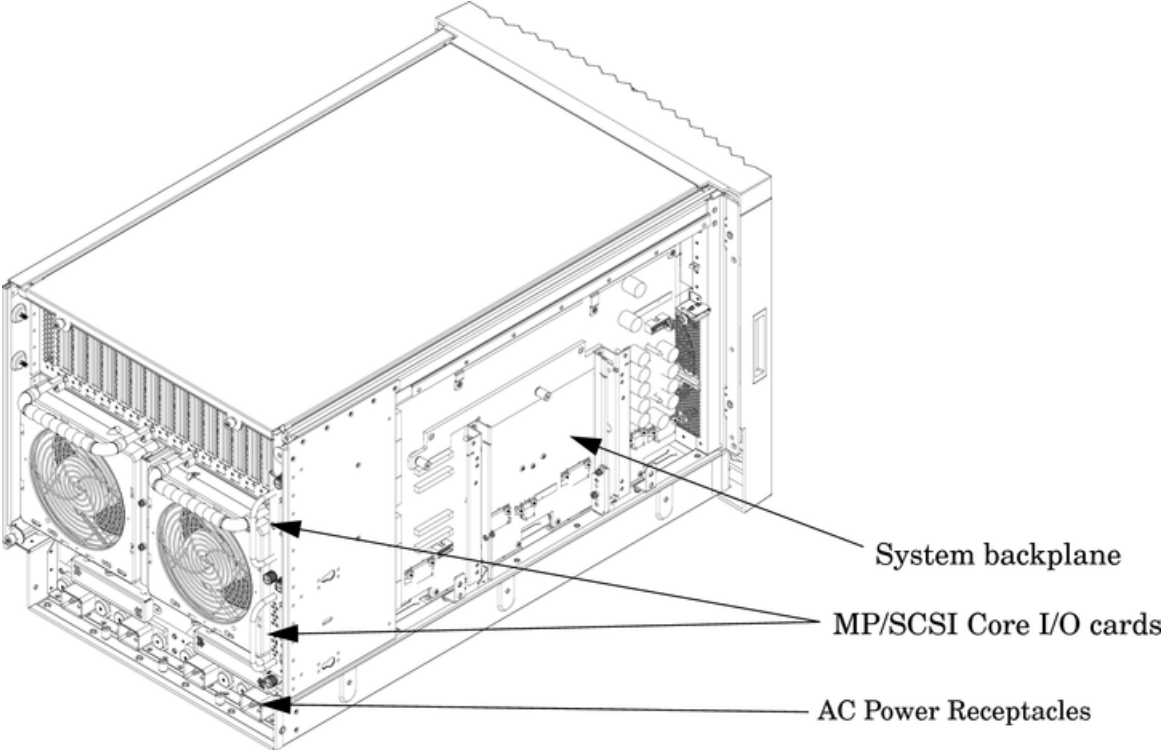
A cable harness that connects from the rear of the BPSs to the system backplane provides DC power distribution.

Access the system backplane by removing the left side cover. The system backplane inserts by a guide/insertion mechanism using a single large jack screw assembly.

SCSI ribbon-cable assemblies route from the mass storage area to the backside of the system backplane and to the Procurium PCI MP core I/O card.

Access the cell boards from the right side of the chassis behind the removable side cover.

Figure 1-12 Left-Rear View of HP 9000 rp7420 server



2 Unpacking the Server

HP shipping containers are designed to protect their contents under normal shipping conditions. After the equipment arrives, carefully inspect each carton for signs of shipping damage. A tilt indicator is installed on each carton shipped. The beads in the indicator roll to the upper position if the container was tilted to an angle that could cause equipment damage. The tilt indicator itself has two windows, and each window, under normal conditions, shows four beads present. If a carton was mishandled or accidentally dropped, the tilt indicator indicates missing beads. If damage is found, document the damage with photographs and contact the transport carrier immediately.

Examine the server cabinet for visible shipping damage. After unpacking the cabinet, check for damage that might have been obscured by the shipping container. If damage is found after visual inspection, document the damage with photographs and contact the transport carrier immediately.

If the equipment has any damage, a damage claim form must be obtained by the customer from the shipping representative. The customer should complete the form and return it to the shipping representative.



NOTE: The server might come already racked or ready for rack installation.

Unpacking a Racked Server

This section contains information about unpacking the cabinet.



WARNING! Wear protective glasses while cutting the plastic bands around the shipping container. These bands are under tension. When cut, they can spring back and cause serious eye injury.



NOTE: Position the pallet to allow for enough space to roll the cabinet off the pallet before unpacking.

To remove the cabinet, follow these steps:

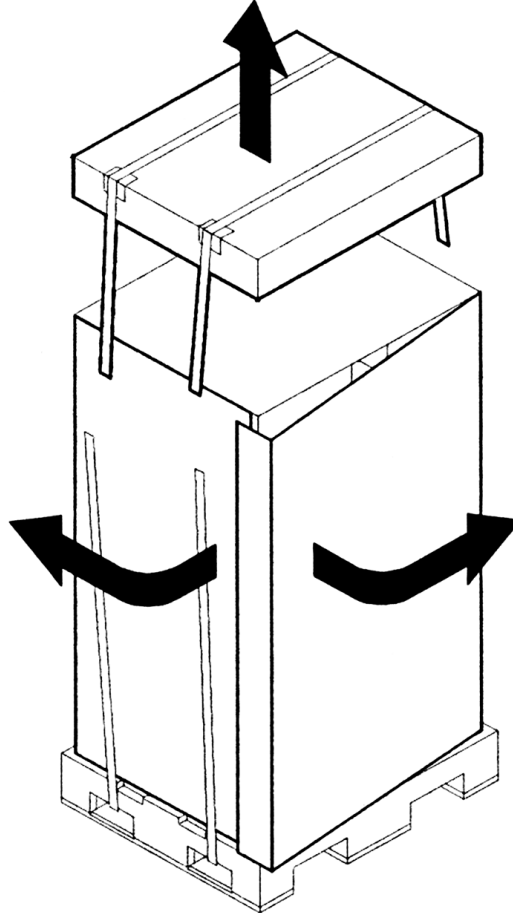
1. Cut the polystrap bands around the shipping container.
2. Lift the cardboard top cap from the shipping box. See Figure 2-1.

3. Remove the corrugated wrap from the pallet.
4. Remove the packing materials.



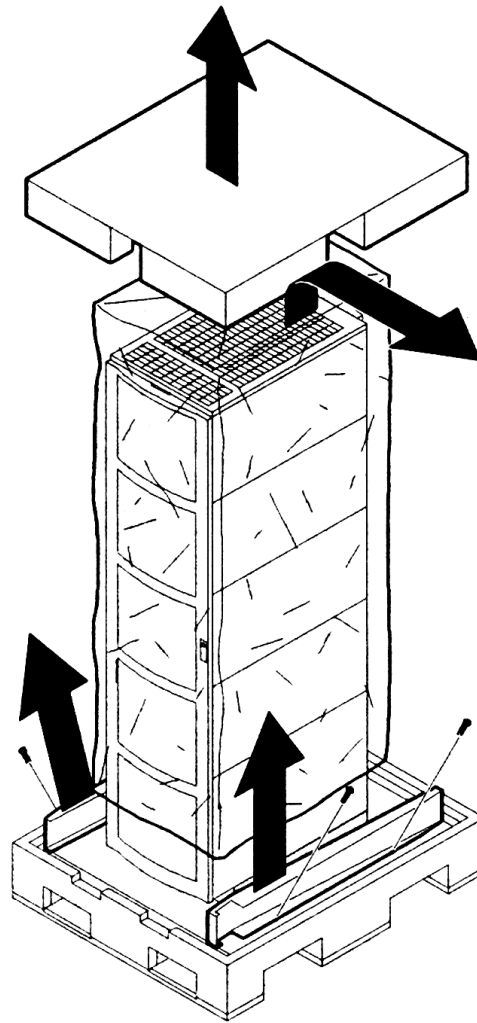
CAUTION: The plastic wrapping material should be cut off rather than pulled off. Pulling the plastic covering off represents an electrostatic discharge (ESD) hazard.

Figure 2-1 Removing the Polystraps and Cardboard



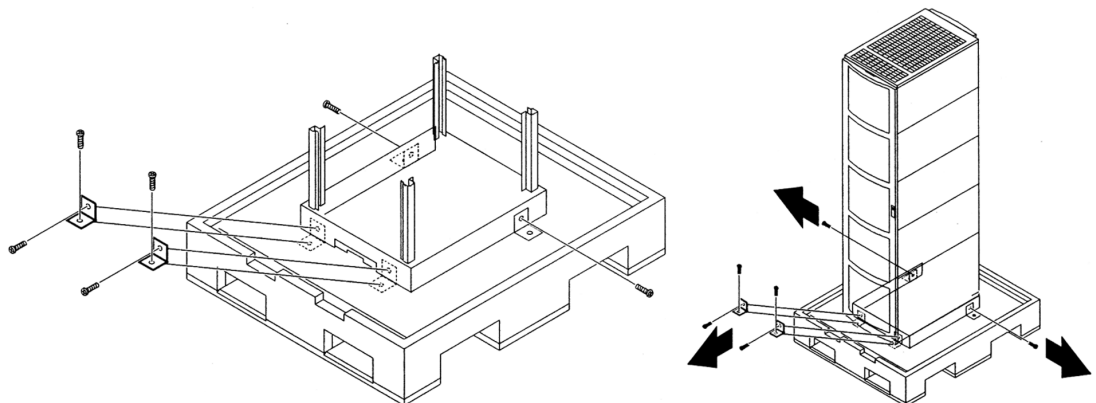
5. Remove the four bolts that hold the ramps to the pallet, and remove the ramps. See Figure 2-2.

Figure 2-2 Removing the Shipping Bolts and Plastic Cover



6. Remove the six bolts from the base that attaches the rack to the pallet. See Figure 2-3.

Figure 2-3 Preparing to Roll Off the Pallet



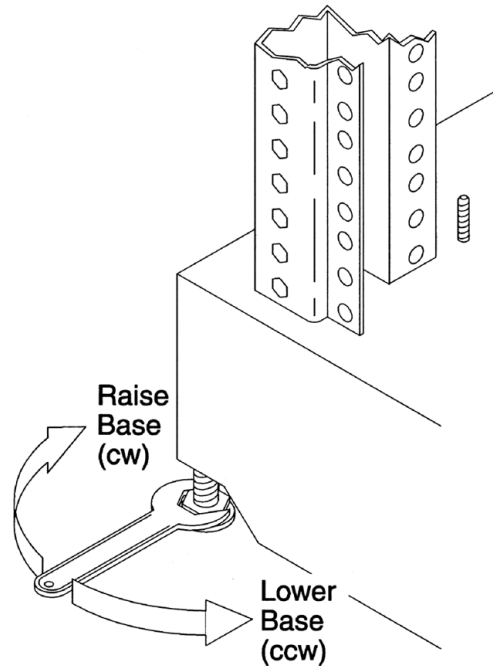


WARNING! Be sure that the leveling feet on the rack are raised before you roll the rack down the ramp and any time you roll the rack on the casters. Use caution when rolling the cabinet off the ramp. A single server in the cabinet weighs approximately 665 pounds. HP strongly recommends that two people roll the cabinet off the pallet.

Securing the Cabinet

When in position, secure and stabilize the cabinet, using the leveling feet at the corners of the base. Install the anti-tip mechanisms on the bottom front and rear of the rack.

Figure 2-4 Securing the Cabinet



Unpacking a Non-Racked Server



NOTE: If this server was delivered with a wheel kit, proceed to Chapter 3 (page 41).

NOTE: HP recommends the use of a lifter, such as a RONI Company model 17000 SP 400 lifting device, when moving a non-racked system (Figure 2-5). If no lifter is available, install the lift handle panels provided with the system.

Unloading With a Lifter

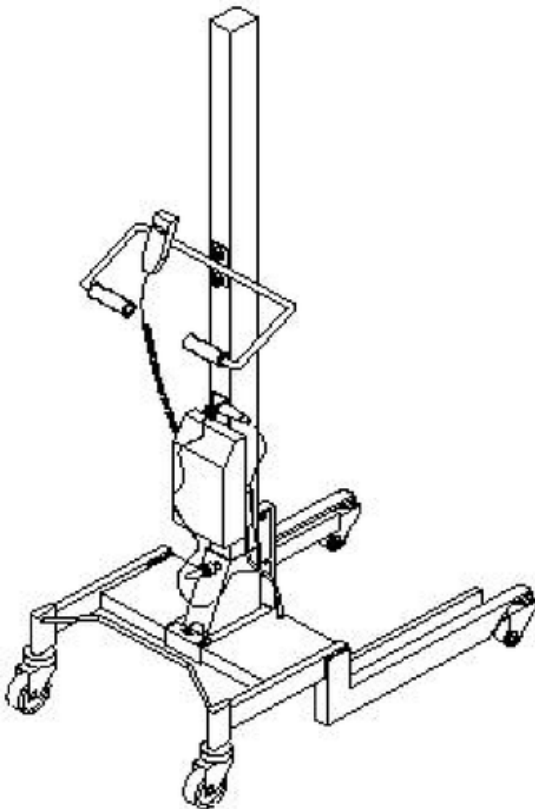
To unload the server from the pallet using a lifter, follow these steps.



WARNING! Use caution when using a lifter. Because of the weight of the server, it must be centered on the lifter forks before raising it off the pallet to avoid injury.

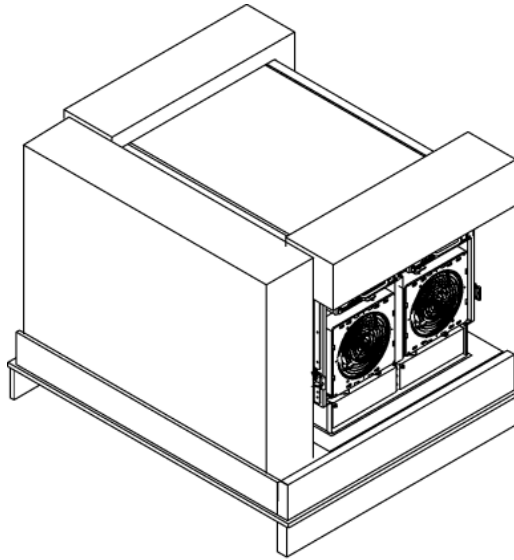
Never extend more than one server from the same cabinet while installing or servicing another server product. Failure to follow these instructions could result in the cabinet tipping over.

Figure 2-5 RONI Lifter



1. To remove the banding and carton top from the server pallet, follow the instructions on the outside of the server packaging.

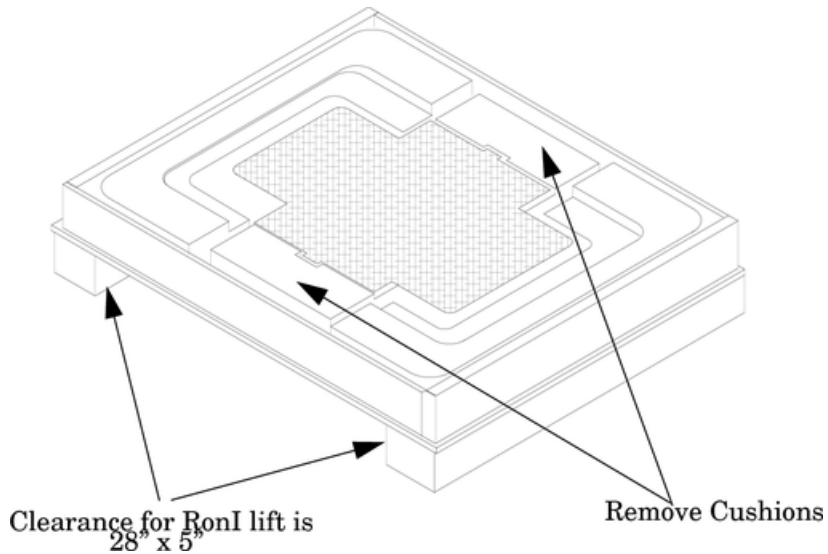
Figure 2-6 Server with Shipping Box Removed



MWK001
3/10/03

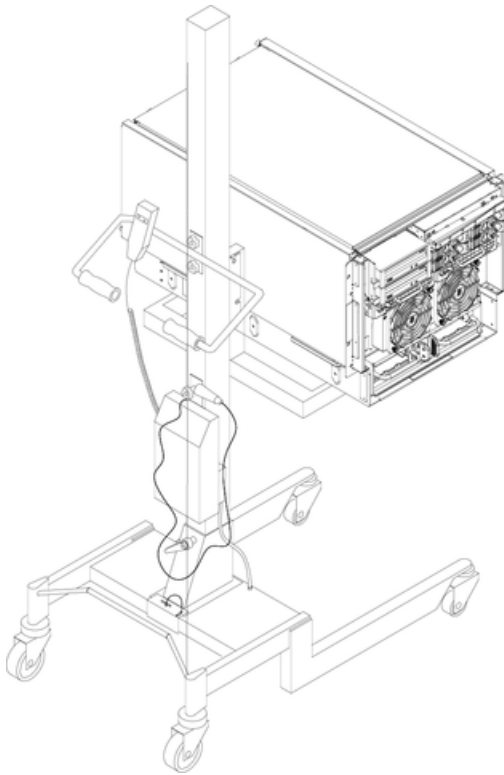
2. Remove all cartons from the pallet, leaving only the server.
3. Remove the two foam cushions for lift access as shown in Figure 2-7.

Figure 2-7 Remove Cushions for Lift Access



4. Insert the lifter forks under the server.
5. Carefully roll the lift forward until it is fully positioned against the side of the server.
6. Slowly raise the server off the pallet until it clears the pallet cushions.

Figure 2-8 Raising a Server Off the Pallet



7. Roll the lifter and server away from the pallet. Do not raise the server any higher than necessary when moving it over to the rack.



NOTE: When installing the system in a rack, use the *HP J1530B Rack Integration Kit Installation Guide*.

Unloading the Server With Lift Handle Panels



WARNING! Use this procedure only if an HP approved lift is not available. This procedure should only be attempted by two authorized HP service technicians.

Before attempting this procedure, HP recommends that you remove all cell boards and AC power supplies. Instructions for removing these components can be found in the [Chapter 6 \(page 83\)](#). Review local safety regulations before attempting to move the system, using the lift handle panels.

Failure to observe these precautions can cause serious injury to personnel or damage to equipment.



CAUTION: Unpack the server in an ESD safe environment. Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the server.

To install the lift panels, follow these steps:

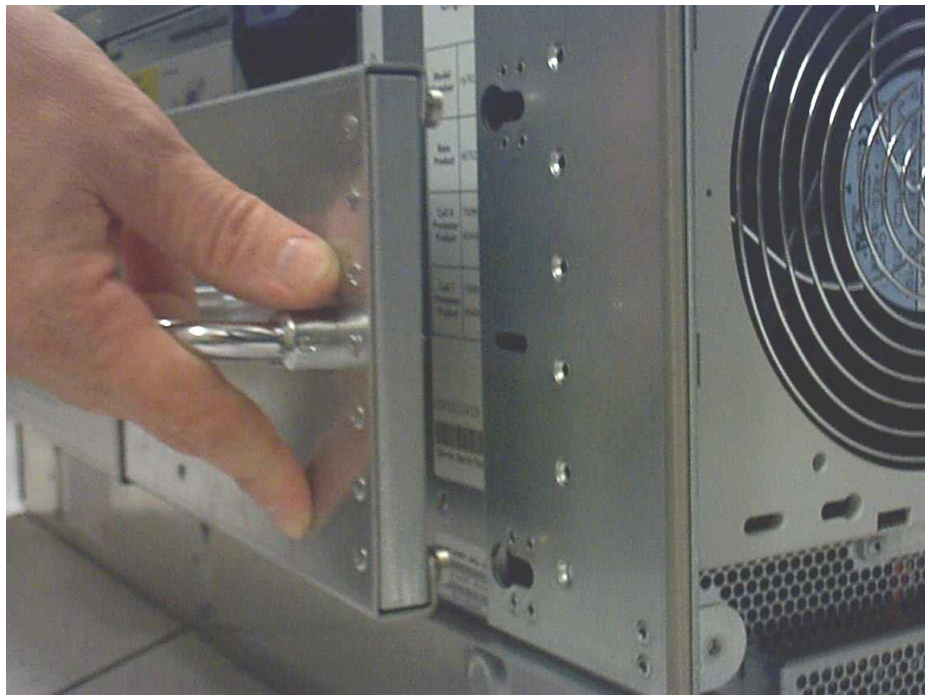
1. Remove both side covers. If present, remove the front panel.
2. Locate lift handles and remove from storage plate.
3. Orient lift handle panels such that when installed, the handles hang down at 90 degrees and lock in a horizontal position during lifting.

Figure 2-9 Positioning the Lift Handles



4. With one handle in each hand, install the pin end of the panel into the back side of the front rack mount ears on the chassis.

Figure 2-10 Inserting the Pins Into the Rack



5. Pull the string plunger out, move the handles apart, and install the shoulder washer end of the panel into the keyway feature.

Figure 2-11 Lift Handles Mounted



6. Continue to pull the handles apart until the spring plunger snaps into final position. The spring plunger drops down into the recess position.
7. Ensure that the handles are secure by pressing the handles together and moving back and forth.
8. For the other handle, repeat steps 3 through 7.
9. To lift the server, rotate the handles 90 degrees to horizontal position.



NOTE: If installing the system in a rack, see the *Installation Guide, HP J1530B Rack Installation Kit*.

10. After moving the server, remove the lift handle panels from the chassis and reinstall the server covers and front bezel. Refer to the installation guide, HP J1530B rack installation kit.

Installing the Server Into the Rack

Any server that is to be installed into a rack is shipped with equipment slides. With every set of slides comes an installation guide: *Installation Guide, HP J1530B Rack Installation Kit*.

3 Installing Accessories

This chapter describes how to install components into the server that are not factory integrated.

Installing the Wheel Kit

Compare the packing list shown in Table 3-1 with the contents of the wheel kit before installing the wheels.

Table 3-1 Wheel Kit Packing List

Part Number	Description	Quantity
A6753-04013	Wheel Kit consisting of the following components:	1
A6753-04002	Right side caster cover	1
A6753-04003	Left side caster cover	1
A6753-04004	Top cover	1
A6753-00007	Caster cover	2
A6753-04001	Right front caster assembly	1
A6753-04005	Right rear caster assembly	1
A6753-04006	Left front caster assembly	1
A6753-04007	Left rear caster assembly	1
0515-2478	M4 x 0.7 8mm T15 steel zinc machine screw (used to attach each caster to the chassis)	4
A6093-44013	Plywood unloading ramp	1
Not applicable	Phillips head wood screw (used to attach the ramp to the pallet)	2

Required Tools

The following list provides the installer with the recommended tools to perform the wheel kit installation.

- Diagonal side cutters
- Safety glasses
- Torx screwdriver with T-15 bit
- Phillips head screwdriver

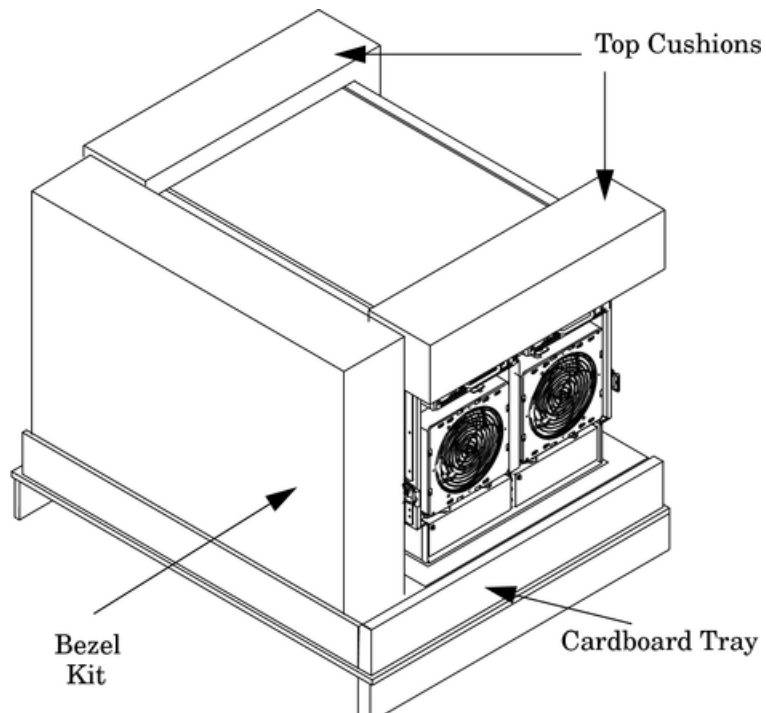


WARNING! Wear protective glasses while cutting the plastic bands around the shipping container. These bands are under tension. When cut, they can spring back and cause serious eye injury.

To attach the wheels to the server, follow these steps:

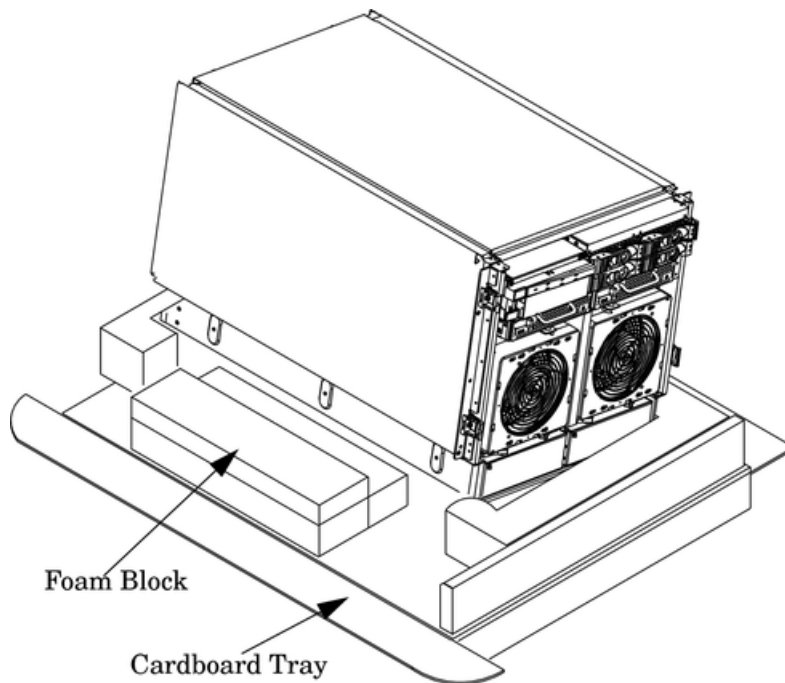
1. Cut and remove the polystrap bands securing the HP server to the pallet.
2. Lift the carton top from the cardboard tray resting on the pallet.
3. Remove the bezel kit carton and the top cushions from the pallet (Figure 3-1).

Figure 3-1 Component Locations



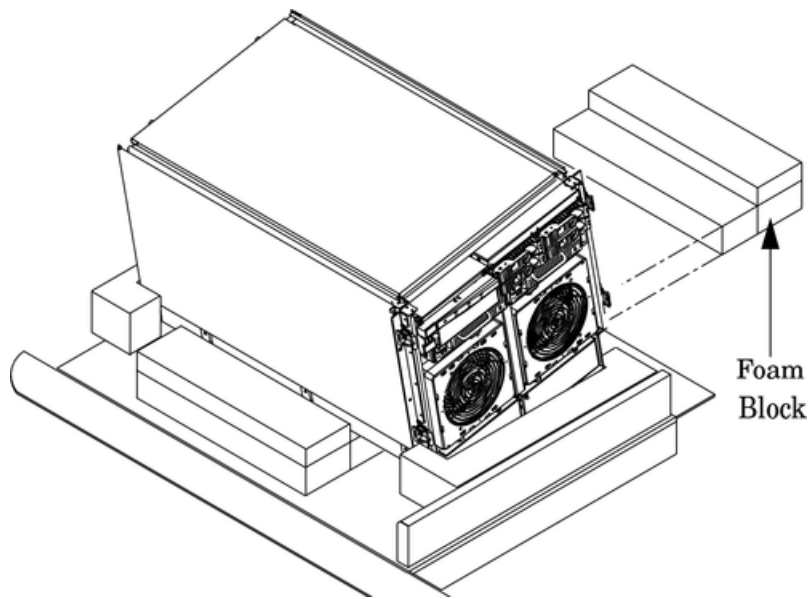
4. Unfold the bottom cardboard tray.
5. Carefully tilt the server and place one of the foam blocks (A6093-44002) under the left side of the server. Do not remove any other cushions until instructed to do so.

Figure 3-2 Left Foam Block Position



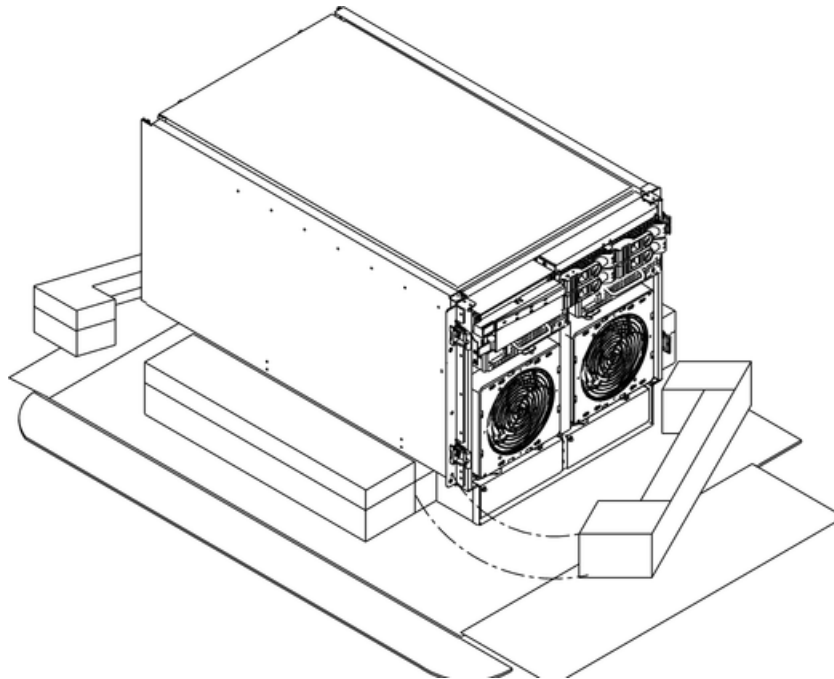
6. Carefully tilt the server and place the other foam block provided in the kit under the right side of the server.

Figure 3-3 Right Foam Block Position



7. Remove the cushions from the lower front and rear of the server. Do not disturb the side cushions.

Figure 3-4 Foam Block Removal



8. Locate and identify the caster assemblies. Table 3-2 shows the caster part numbers.



NOTE: The caster part number is stamped on the caster mounting plate.

Table 3-2 Caster Part Numbers

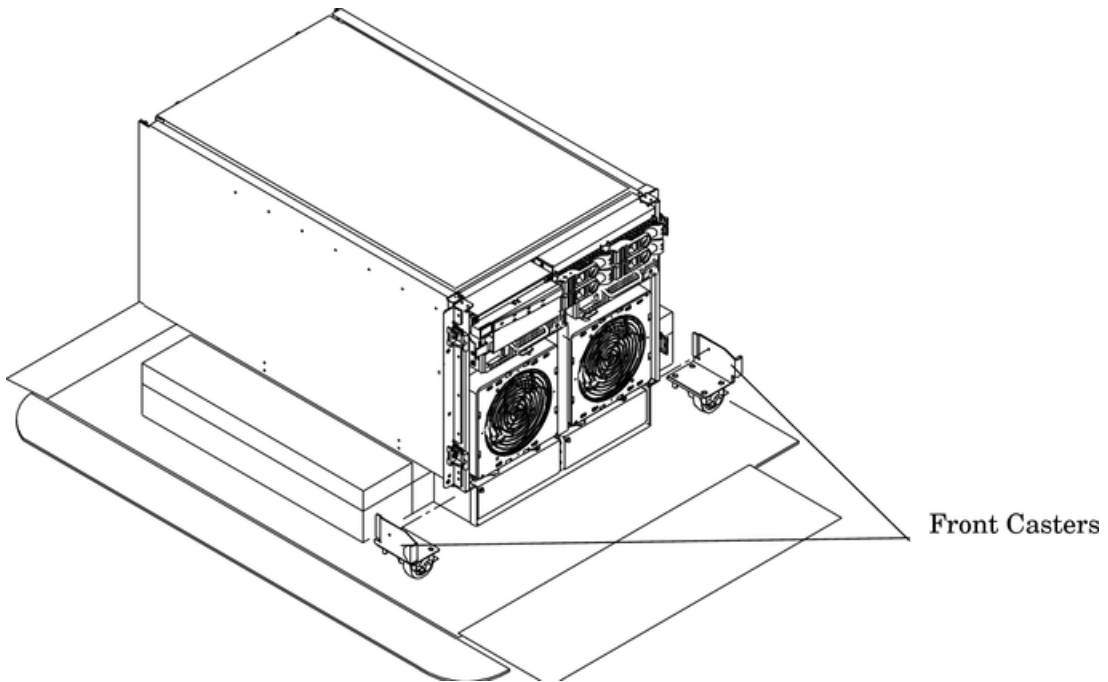
Caster	Part Number
Right front	A6753-04001
Right rear	A6753-04005

Table 3-2 Caster Part Numbers (continued)

Caster	Part Number
Left front	A6753-04006
Left rear	A6753-04007

9. Locate and remove one of the four screws from the plastic pouch. Attach the caster to the server.

Figure 3-5 Attaching a Caster to the Server



10. Attach the remaining casters to the server using the screws supplied in the plastic pouch.
11. Remove the foam blocks from the left and right side of the server.
12. Locate the plywood ramp.
13. Attach the ramp to the edge of the pallet.



NOTE: There are two pre-drilled holes in the ramp. Use the two screws taped to the ramp to attach the ramp to the pallet.

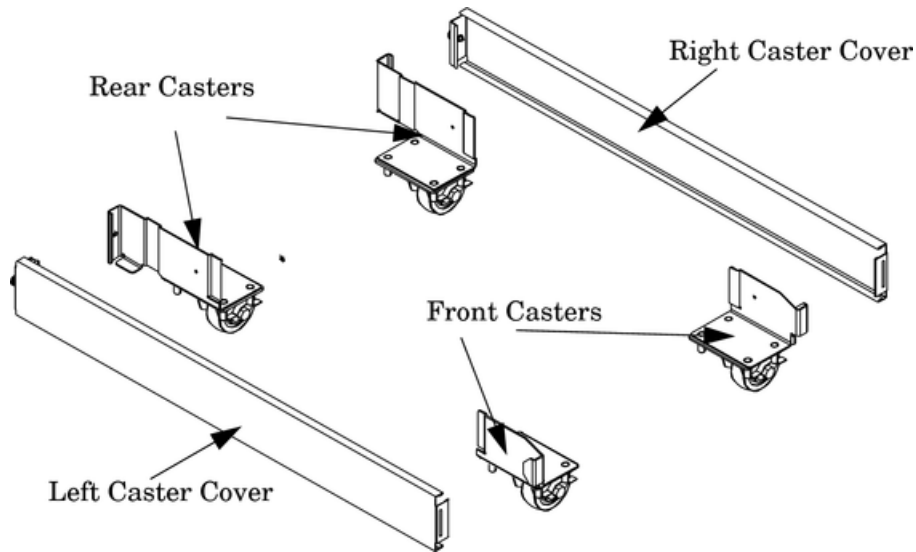
14. Carefully roll the server off the pallet and down the ramp.
15. Locate the caster covers.



NOTE: The caster covers are designed to fit on either side of the server.

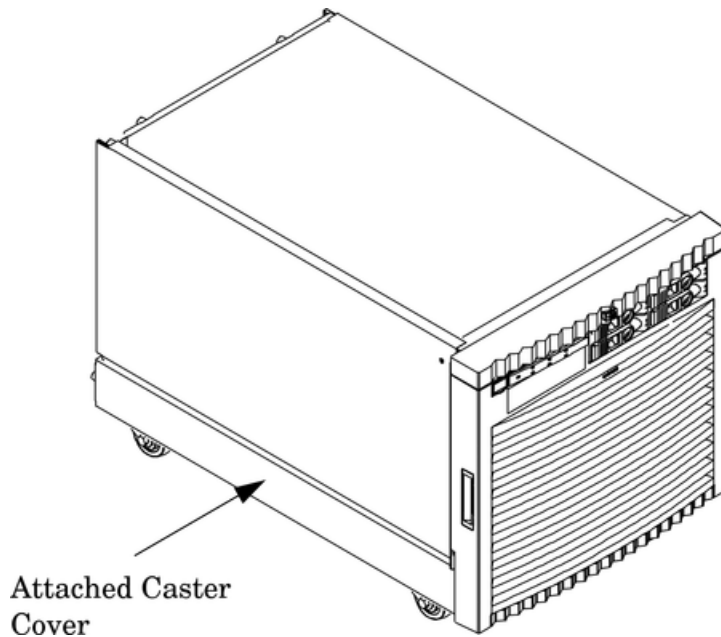
16. Insert the slot on the caster cover into the front caster. Secure the cover to the server by tightening the captive screw on the cover at the rear of the server.

Figure 3-6 Securing Each Caster Cover to the Server



17. Wheel kit installation is complete when both caster covers are attached to the server and the front bezel and all covers are installed.

Figure 3-7 Server With Wheel Kit Installed



PCI-X Card Cage Assembly I/O Cards

A number of PCI and PCI-X I/O cards are supported in the HP 9000 rp7420 server. Known cards supported at the release of this manual are shown in Table 3-3.

Table 3-3 HP 9000 rp7420 server I/O Cards

Part Number	Card Description	Number of Cards Supported (B - Bootable)
A3739B	FDDI Dual Attach	15
A6847A	Next Generation 1000B-SX	15
A6825A	Next Generation 1000B-T	15

Table 3-3 HP 9000 rp7420 server I/O Cards (continued)

Part Number	Card Description	Number of Cards Supported (B - Bootable)
A5149A	Ultra2 SCSI	15B
A5150A	2-port Ultra2 SCSI	15B
A5159B	2-port FWD SCSI	15B
A5230A	10/100B-TX (RJ45)	15
A5483A	ATM 622 (MMF connector)	15
A5506B	4-port 10/100B-TX	15
A5513A	ATM 155 (MMF connector)	15
A5515A	ATM 155 (UTP5 connector)	15
A5783A	Token Ring (4/16/100 Mb/s)	15
A5838A	2-port Ultra2-SCSI + 2-port 100T	15B
A5856A	RAID 4Si	12B
A6386A	Hyperfabric II	8
A6748A	8-port Terminal MUX	15
A6749A	64-port Terminal MUX	15
A6794AX	Procurium GigE LAN/SCSI combo card	2B
A6795A	2 G FC Tachlite	15B
A6826A	2-port 2 Gb FC	15B
A6828A	1-port U160 SCSI	15B
A6829A	2-port U160 SCSI	15B
A7011A	1000 BaseSX Dual Port	15
A7012A	1000 BaseT Dual Port	15
A7143A	U160 RAID - SmartArray 5304	12B
A7173A	2 port U320 SCSI	15B
J3525A	2-port serial (X25/FR/SDLC)	15
J3526A	4-port serial (X25/FR)	15
Z7340A	8-port ACC	16
A4800A	FWD SCSI	15B
A4926A	Gigabit Ethernet (1000B-SX)	15
A4929A	Gigabit Ethernet (1000B-T)	15
A5158A	Fibre Channel PCI Adapter	15B
A6092A	Hyperfabric (PCI 4X)	4
A9782A	PCI-X 1000Base-T GigE/2Gb Combo	15B
A9784A	PCI-X 1000Base-T GigE/2G FC Combo	15B
A9890A	SmartArray 6402 2-channel RAID	12B
A9891A	SmartArray 6404 4-channel RAID	12B

Table 3-3 HP 9000 rp7420 server I/O Cards (continued)

Part Number	Card Description	Number of Cards Supported (B - Bootable)
AB286A	PCI-X 2-Port 4X InfiniBand HCA (HPC)	1
AB287A	10G Ethernet	2
AB290A	U320 SCSI/GigE Combo Card	15B
AB378A	1-port 4 Gb FC card PCI-X	15B
AB379A	2-port 4 Gb FC card PCI-X	15B
AB465A	PCI-X 2-port 1000B-T/2-port 2 Gb FC Combo	15B
AB545A	4-port 1000B-T Ethernet	15
AD278A	8-port Terminal MUX	15
AD279A	64-port Terminal MUX	15

Installing PCI I/O Cards

HP 9000 rp7420 servers implement manual release latch (MRL) hardware for use in online add or replacement (OLAR) operations. If an MRL is left open while the server is booting, HP-UX can incorrectly cache PCI slot power status causing OLAR operations to fail. To prevent this situation, ensure all the MRLs are closed before booting the server.

If OLAR reports that a slot is present and powered off, but no OLAR operations to turn power on to that slot have succeeded even after the MRL is closed, the MRL may have been left open during boot. To clear this condition, close the MRL for the PCI slot then power off the PCI slot using the `rad -o` command. This will allow future OLAR operations to succeed on this PCI slot.



IMPORTANT: PCI I/O card installation procedures should be downloaded from the HP website at <http://docs.hp.com>. Background information and procedures for adding a new PCI I/O card using online addition are found in the *Interface Card OL* Support Guide*.

Prerequisites for Adding a PCI I/O Card Using the Attention Button

The prerequisites for this procedure are:

- Drivers for the card have already been installed.
- There are no drivers associated with the slot.
- The green power LED is steady Off.

Should the empty slot be in the On state, use the `olrad` command or the `pdweb` tool to power off the slot.

- The yellow attention LED is steady Off or is blinking (if a user has requested the slot location).
- For details on card installation, see the host bus adapter (HBA) documentation.

- To determine the status of all the PCI I/O slots, run the `olrad -g` command.
- Obtain a copy of the interface card guide for instructions on preparing the operating system for the online addition of the PCI I/O card before attempting to insert a PCI I/O card into the PCI-X card cage assembly backplane slot.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the server.

This procedure describes how to perform an online addition of a PCI card using the attention button for cards whose drivers support OLAR. The attention button is also referred to as the doorbell.

To add a PCI I/O card, follow these steps:

1. Remove the top cover.
2. Remove the PCI bulkhead filler panel.
3. Flip the PCI MRL for the card slot to the open position. See [Figure 3-8](#).
4. Install the new PCI card in the slot.



NOTE: Apply a slow, firm pressure to the card to properly seat it into the backplane.

5. Flip the PCI MRL for the card slot to the closed position.

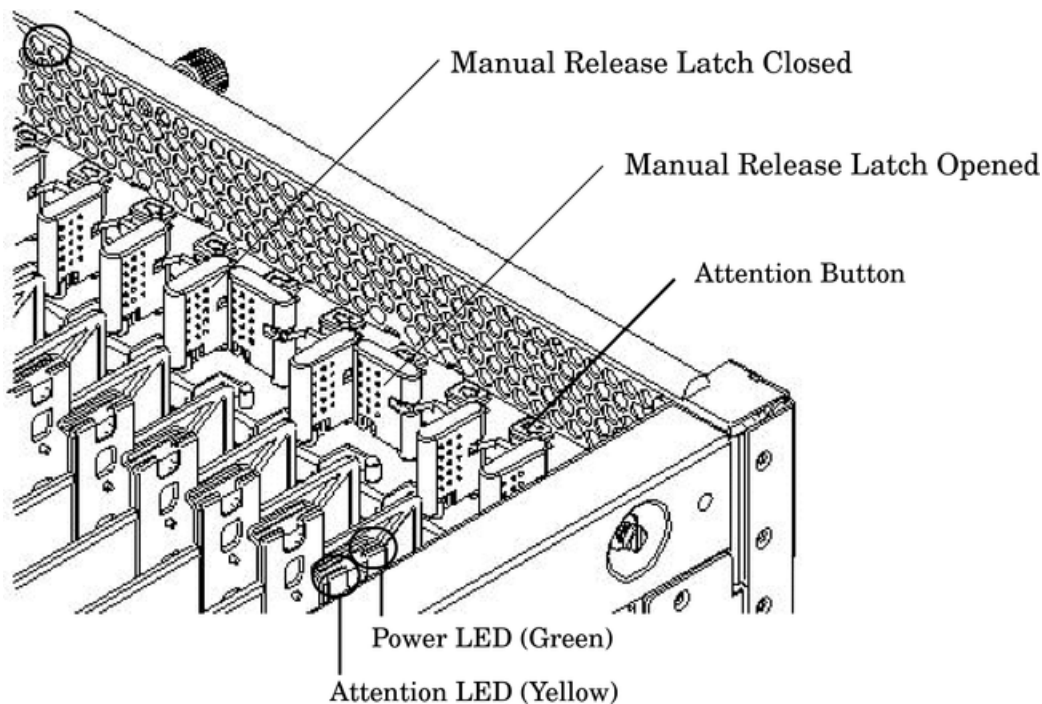


CAUTION: Working out of sequence or not completing the actions within each step could cause the system to crash.

Do not press the attention button until the latch is locked.

6. Press the attention button.
The green power LED starts to blink.

Figure 3-8 PCI I/O Slot Details



7. Wait for the green power LED to stop blinking and remain solid green.

8. Check for errors in the hotplugd daemon log file (default: /var/adm/hotplugd.log).
The critical resource analysis (CRA) performed while doing an attention button initiated add action is very restrictive and the action will not complete—it will fail—to protect critical resources from being impacted. For finer control over CRA actions use pdweb or the olrad command. See the *Interface Card OL* Support Guide* located on the Web at <http://docs.hp.com> for details.
9. Replace the top cover.
10. Connect the cables to the installed PCI card.

4 Cabling and Powering the Server

After you have unpacked the server and moved into position, you must be connect it to an AC power source. Check the AC power for the proper voltage before you power the system on. This chapter describes these activities.

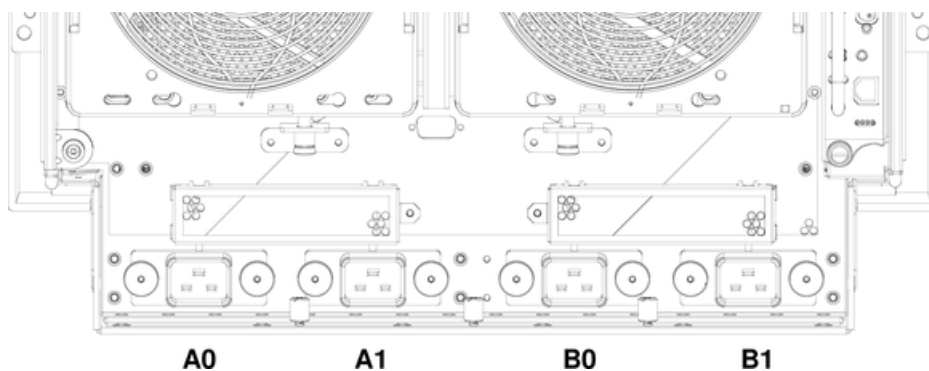
AC Input Power

The server has the following line-cord configurations:

- All four line cords (preferred configuration)
- Cords A0 and A1 only
- Cords B0 and B1 only
- Cords A0 and B0 only
- Cords A1 and B1 only

A single-line-cord configuration is not allowed.

Figure 4-1 Power Cord Configuration



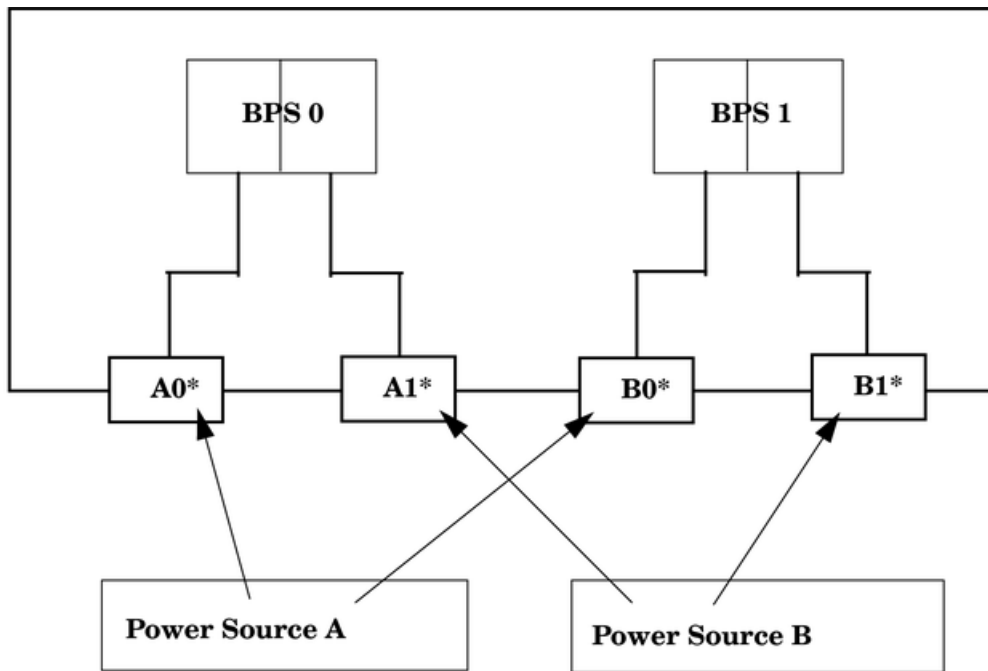
The power cord configuration is passed to the operating system using the `pwrgrd` (Power Grid) command. Each of the five selections in the `pwrgrd` command matches one of the configurations. The appropriate option should be selected for the actual line cord configuration. With the correct configuration selected, the LEDs should be green. When the `pwrgrd` command is invoked, the following menu displays:

```
prompt> pwrgrd
```

```
Power grid configuration preference.  
1. Grid A only (Cords A0,B0 required)  
2. Grid B only (Cords A1,B1 required)  
3. Grids A & B (Cords A0,A1,B0,B1 required)  
4. Cords A0 & B0 only  
5. Cords A1 & B1 only  
Select Option:
```

If two separate power sources are available, the two power supplies can be plugged into the separate power sources, increasing system reliability should one power source fail.

Figure 4-2 Power Source versus Power Distribution



***180-269 VAC**



WARNING! Voltage is present at various locations within the server whenever a power source is connected. This voltage is present even when the main power switch is in the OFF position. To completely remove power, all power cords must be removed from the server. Failure to observe this warning can result in personal injury or damage to equipment.



NOTE: System firmware prevents boot when a single power cord configuration is detected.

Checking the Voltage

This section provides voltage check information for use on the customer site. The emphasis focuses on measuring the voltages at the power cord plug end specified as an IEC 320 C19 type plug. This end plugs directly into the back of the HP 9000 rp7420 server chassis.

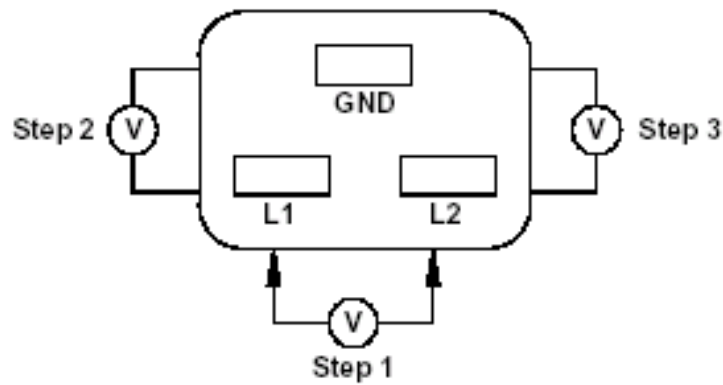


NOTE: Perform these procedures for each power cord to be plugged directly into the back of the HP 9000 rp7420 server. If you do not get the expected results from this voltage check, see “Checking the Voltage (Additional Procedure)” (page 54).

Verifying the Voltage Range of the Receptacle

This measures the voltage between L1 and L2, L1 to ground, and L2 to ground. Three separate measurements are performed during this procedure. For voltage reference points when performing the measurements, see Figure 4-3.

Figure 4-3 Voltage Reference Points for IEC 320 C19 Plug



IMPORTANT: Perform the following measurements for every power cord that plugs into the HP 9000 rp7420 server.

1. Measure the voltage between L1 and L2. This is considered to be a phase-to-phase measurement in North America. In Europe and certain parts of Asia-Pacific, this measurement is referred to as a phase-to-neutral measurement. The expected voltage measured should be between 200–240 VAC regardless of the geographic region.
2. Measure the voltage between L1 and ground. In North America, verify this voltage is between 100–120 VAC. In Europe and certain parts of Asia-Pacific, verify this voltage is between 200–240 VAC.
3. Measure the voltage between L2 and ground. In North America, verify this voltage is between 100–120 VAC. In Europe and certain parts of Asia-Pacific, verify this voltage is 0 (zero) VAC.

Table 4-1 provides single phase voltage measurement examples dependent on the geographic region where these measurements are taken.

Table 4-1 Single-Phase Voltage Examples

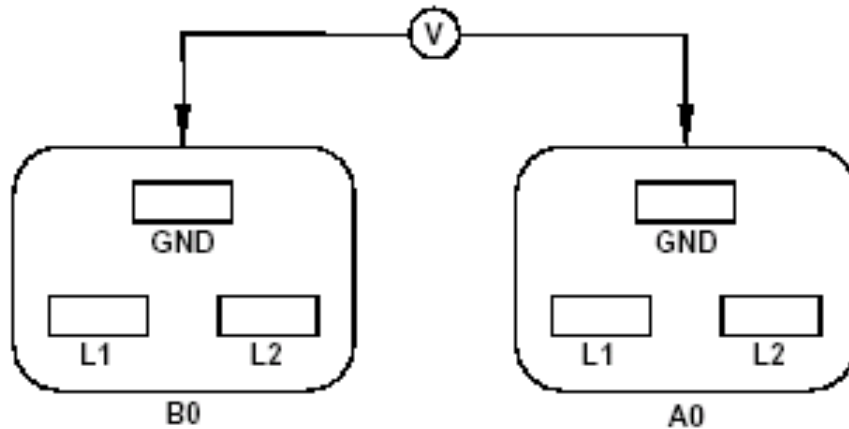
	Japan	North America	Europe ¹
L1-L2	210 V	208 V or 240 V	230 V
L1-GND	105 V	120 V	230 V
L2-GND	105 V	120 V	0 V

¹ In some European countries there might not be a polarization.

Verifying the Safety Ground

This measures the voltage level between B0 and A0. The measurement is taken between ground pins of the two power cords. For ground reference points when performing this measurement, see Figure 4-4.

Figure 4-4 Safety Ground Reference Check



To measure the voltage, follow these steps:

1. Measure the voltage between B0 and A0. Take the AC voltage down to the lowest scale on the volt meter.
2. Insert one probe into the ground pin for B0.
3. Insert the other probe into the ground pin for A0.
4. Verify that the measurement is between 0–5 V AC. If the measurement is 5 V or greater, escalate the situation. Do not attempt to plug the power cords into the HP 9000 rp7420 server.

Checking the Voltage (Additional Procedure)

The voltage check ensures that all phases (and neutral, for international systems) are connected correctly to the cabinet and that the AC input voltage is within limits.

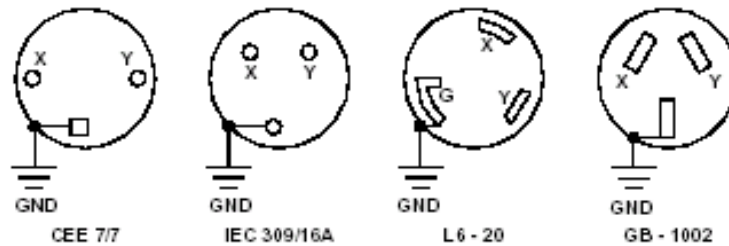
This procedure must be performed if the previous voltage check procedure did not yield the expected results as previously outlined.



NOTE: If a UPS is used, see the applicable UPS documentation for information to connect the server and to check the UPS output voltage. UPS user manual documentation is shipped with the UPS. Documentation can also be found at <http://www.hp.com/racksolutions>.

1. Verify that site power is off.
2. Open the site circuit breakers.
3. Verify that the receptacle ground connector is connected to ground. For connector details, see Figure 4-5.
4. Set the site power circuit breaker to **On**.

Figure 4-5 Wall Receptacle Pinouts



⚠ WARNING! There is a risk of shock hazard while testing primary power. Use properly insulated probes.

5. Verify that the voltage between receptacle pins x and y is between 200 and 240 V AC.
 6. Set the site power circuit breaker to **Off**.
 7. Ensure that power is removed from the server.
 8. Route and connect the server power connector to the site power receptacle.
 - For locking type receptacles, line up the key on the plug with the groove in the receptacle.
 - Push the plug into the receptacle and rotate to lock the connector in place.
-

⚠ WARNING! Do not set site AC circuit breakers serving the processor cabinets to **On** before verifying that the cabinet has been wired into the site AC power supply correctly. Failure to do so might result in injury to personnel or damage to equipment when AC power is applied to the cabinet.

9. Set the site power circuit breaker to **On**.
10. Set the server power to **On**.
11. Check that the indicator light on each power supply is on.

MP Core I/O Connections

Each HP 9000 rp7420 server can have up to two MP core I/O board sets installed. Which allows two partitions to operate, or MP core I/O redundancy in a single partition configuration. Each MP core I/O board set consists of two boards: the MP/SCSI board and the LAN/SCSI board. The MP/SCSI board is oriented vertically and accessed from the back of the server. The LAN/SCSI is accessed from the PCI/PCI-X expansion card bay. Only the primary MP core I/O board set (MP/SCSI slot 1 and LAN/SCSI slot 8, chassis 1) is required for a single partition implementation. The secondary MP/SCSI board is not necessary for full operation. However, without the secondary MP/SCSI board, only two internal disks can be accessed.

MP/SCSI Connections

The MP/SCSI board is required to update firmware, access the console, turn partition power on or off, access all but two of the internal peripherals, and use other features of the server.

Connections to the MP/SCSI board include the following:

- DB25 connector, by way of the M cable
This RS-232 connector provides connections for a local console, external modem, and a UPS. The server end of the M cable terminates in a DB25 connector. The opposite side of the cable terminates in three DB9 connectors labeled CONSOLE, UPS, and REMOTE.
- 10/100 Base-T LAN RJ45 connector (for LAN and web console access).
This LAN uses standby power and is still active if the front panel power switch is off and AC is present.
- Internal LVD Ultra 160 SCSI channel for connections to internal mass storage
- Internal SE Ultra SCSI channel for connection to an internal removable media device.

LAN/SCSI Connections

The LAN/SCSI board is a PCI form factor card that provides the basic external I/O connectivity for the system.

Connections to the LAN/SCSI board include the following:

- PCI-X to PCI-X bridge for multi-device compatibility.
- Internal LVD Ultra 160 SCSI channel for connections to internal mass storage.
- External LVD Ultra 160 SCSI channel connected to a 68-pin VHDCI connector.
- 10/100/1000 Base-T LAN RJ45 connector.

The primary LAN interface is located on the LAN/SCSI board installed in the right-most slot when viewing the system from the back.

Management Processor Access



NOTE: To access the MP for the initial installation, you must first connect the M cable to the DB25 connector located on the primary MP/SCSI board. The primary MP/SCSI board is located in the lower MP/SCSI board slot.

Setting Up the Customer Engineer Tool (PC)

The Customer Engineer (CE) Tool is usually a laptop. It enables communication with the MP in the HP 9000 rp7420 server. The MP monitors the activity of either a one partition or a multiple-partition configuration.

During installation, communicating with the MP enables such tasks as:

- Verifying that the components are present and installed correctly
- Setting LAN IP addresses
- Shutting off cell board power

Communication with the MP is established by connecting the CE Tool to the local RS-232 port on the MP Core I/O card.

Setting CE Tool Parameters

After powering on the CE Tool, ensure the communications settings are as follows:

- 8/none (parity)
- 9600 baud
- na (Receive)
- na (Transmit)

If the CE Tool is a laptop using Reflection, ensure communications settings are in place by following these steps:

1. From the Reflection Main screen, pull down the **Connection** menu and select **Connection Setup**.

2. Select **Serial Port**.
3. Select **Com1**.
4. Check the settings and change, if required.
Go to **More Settings** to set Xon/Xoff. Click **OK** to close the More Settings window.
5. Click **OK** to close the Connection Setup window.
6. Pull down the **Setup** menu and select **Terminal** (under the **Emulation** tab).
7. Select terminal type VT100.
8. Click **Apply**.
This option is not highlighted if the terminal type you want is already selected.
9. Click **OK**.

Connecting the CE Tool to the Local RS-232 Port on the MP

This connection allows direct communications with the MP. Only one window can be created on the CE Tool to monitor the MP. When enabled, it provides direct access to the MP and any partition.

To connect the CE Tool to the Local RS-232 port on the MP, follow these steps:

1. Connect one end of a null modem cable (9-pin to 9-pin) (Part Number 5182-4794) to the M cable connector labeled CONSOLE.
2. Connect the other end of the RS-232 cable to the CE Tool.

Standby Power and Logging In to the MP

After connecting the serial device, it is possible to log in to the Management Processor (MP). Housekeeping power (also known as standby power) is generated as soon as AC power is applied to the server. Because the MP uses standby power, it is possible to log in to the MP even when the power switch is in the OFF position. The power switch is a DC power switch that controls +48 V DC.

Before powering up the HP 9000 rp7420 server for the first time, follow these steps:

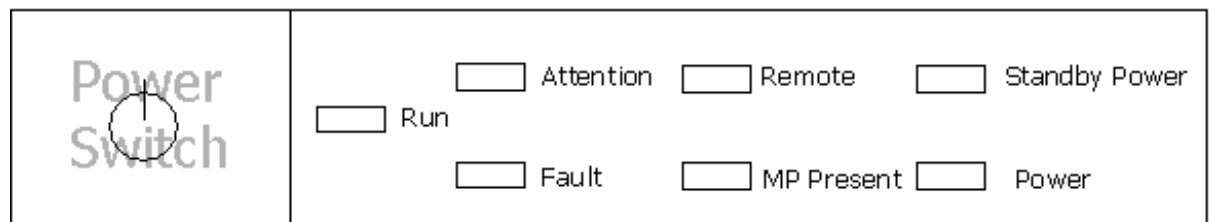
1. Verify that the AC voltage at the input source is within specifications for each server being installed.
2. If not already done so, power on the serial display device.
The preferred tool is the CE Tool running Reflection.

To power up the MP, set up a communications link, and log in to the MP, follow these steps:

1. Connect the server to AC power.

On the front of the HP 9000 rp7420 server, a solid green Standby Power LED, a solid green MP Present LED, and a flashing amber Attention LED illuminate after about 30 seconds.

Figure 4-6 Front Panel Display



2. Check the bulk power supply LED for each BPS.
When on, the breakers distribute power to the BPSs. AC power is present at the BPSs:

- When power is first applied. The BPS LEDs flash amber.
- After 30 seconds has elapsed. The flashing amber BPS LED for each BPS becomes a flashing green LED.

To interpret LED indicators, see the power cord policies.

3. Log in to the MP:
 - a. Enter **Admin** at the login prompt. The login is case sensitive.
It takes a few moments for the MP prompt to display. If it does not display, verify the laptop serial device settings are correct:
8 bits, no parity, 9600 baud, and na for both Receive and Transmit. Then, try again.
 - b. Enter **Admin** at the password prompt. The password is case sensitive.
The MP Main Menu is displayed:

Figure 4-7 MP Main Menu

```

Welcome to the
rp7420 Management Processor
(c) Copyright 1995-2003 Hewlett-Packard Co., All Rights Reserved.
Version A.0.017

MP MAIN MENU:
CO: Consoles
VFP: Virtual Front Panel (partition status)
CM: Command Menu
CL: Console Logs
SL: Show Event Logs
HE: Help
X: Exit Connection

MP> _

```

Configuring LAN Information For the MP

To set the MP LAN IP address, follow these steps:

1. At the MP Main Menu prompt (*MP>*), enter **cm**.
2. From the MP Command Menu prompt (*MP:CM>*), enter **1c** (for LAN configuration).

The default values display, and a prompt to modify the default values displays.

Write down the information for future use.



NOTE: If the Command Menu is not shown, enter **q** to return to the MP Main Menu, and enter **cm**.

3. Enter **1c** and press the **Return** key.

The following screen displays:

Figure 4-8 The `lc` Command Screen

```
MP:CM> LC

This command modifies the LAN parameters.

Current configuration of MP LAN interface
  MAC address   : 00:30:6e:05:09:24
  IP address    : 15.99.83.215   (0x0f6353d7)
  Hostname     : quartz-s
  Subnet mask  : 255.255.255.0   (0xffffffff00)
  Gateway      : 15.99.83.254   (0x0f6353fe)
  Status       : UP and RUNNING
  AutoNegotiate : Enabled
  Data Rate    : 100 Mb/s
  Duplex       : Half
  Error Count  : 0
  Last Error   : none

Do you want to modify the configuration for the customer LAN? (Y/[N]) q
MP:CM>
```



NOTE: The value in the “IP address” field has been set at the factory. Obtain the actual LAN IP address from the customer.

4. At the *Do you want to modify the configuration for the customer LAN?* prompt, enter **y**.
The current IP address is shown; and the following prompt displays: *Do you want to modify it? (Y/[N])*
5. Enter **y**.
6. Enter the new IP address.
The customer must provide this address for network interface 0.
7. Confirm the new address.
8. Enter the MP Network name.
This is the host name for the customer LAN. The name can be as many as 64 characters in length, and include alphanumeric characters: - (dash), _ (under bar), . (period), or a space. HP recommends that the name be a derivative of the complex name. For example, `Acme.com_MP`.
9. Enter the LAN parameters for the Subnet mask and Gateway address fields.
This information must come from the customer.
10. The server indicates the parameters have been updated and returns to the MP Command Menu prompt (`MP:CM>`).
11. To check the LAN parameters and status, enter the `ls` command at the MP Command Menu prompt (`MP:CM>`).
A screen similar to [Figure 4-9](#) displays, enabling verification of the settings:

Figure 4-9 The ls Command Screen

```
MP:CM> LS

Current configuration of MP LAN interface
MAC address  : 00:30:6e:05:09:24
IP address   : 15.99.83.215   (0x0f6353d7)
Hostname    : quartz-s
Subnet mask  : 255.255.255.0   (0xfffff00)
Gateway     : 15.99.83.254   (0x0f6353fe)
Status      : UP and RUNNING
AutoNegotiate : Enabled
Data Rate   : 100 Mb/s
Duplex      : Half
Error Count  : 0
Last Error  : none

MP:CM>
```

12. To return to the MP Main Menu, enter **ma** at the Command Screen.
13. To exit the MP, enter **x** at the MP main menu.

Accessing the MP Through a Web Browser

Web browser access is an embedded feature of the MP. The web browser enables access to the server through the LAN port on the core I/O card. You must configure the MP from an ASCII console.



NOTE: The MP has a separate LAN port from the system LAN port. It requires a separate LAN drop, IP address, and networking information from that of the port used by HP-UX.

Before starting this procedure, the following information is required:

- IP address for the MP LAN
- Subnet mask
- Gateway address
- Host name (this is used when messages are logged or printed)

To configure the LAN port for a Web browser, follow these steps:

1. Connect to the MP using a serial connection.
2. Configure the MP LAN. See “Configuring LAN Information For the MP” (page 58).
3. To enter the Command Menu, enter **cm**.
4. To display and set MP remote access, enter **sa** at the MP:CM> prompt.

Figure 4-10 sa Command Screen

```
MP:CM> sa
```

This command displays and allows modification of access parameters.

```
T - Telnet access           : Enabled.
M - Modem access           : Enabled.
W - Web Console            : Enabled (SSL NOT active).
N - Network Diagnostics    : Disabled.
I - IPMI Lan access        : Disabled.
```

Select access mode to change : w

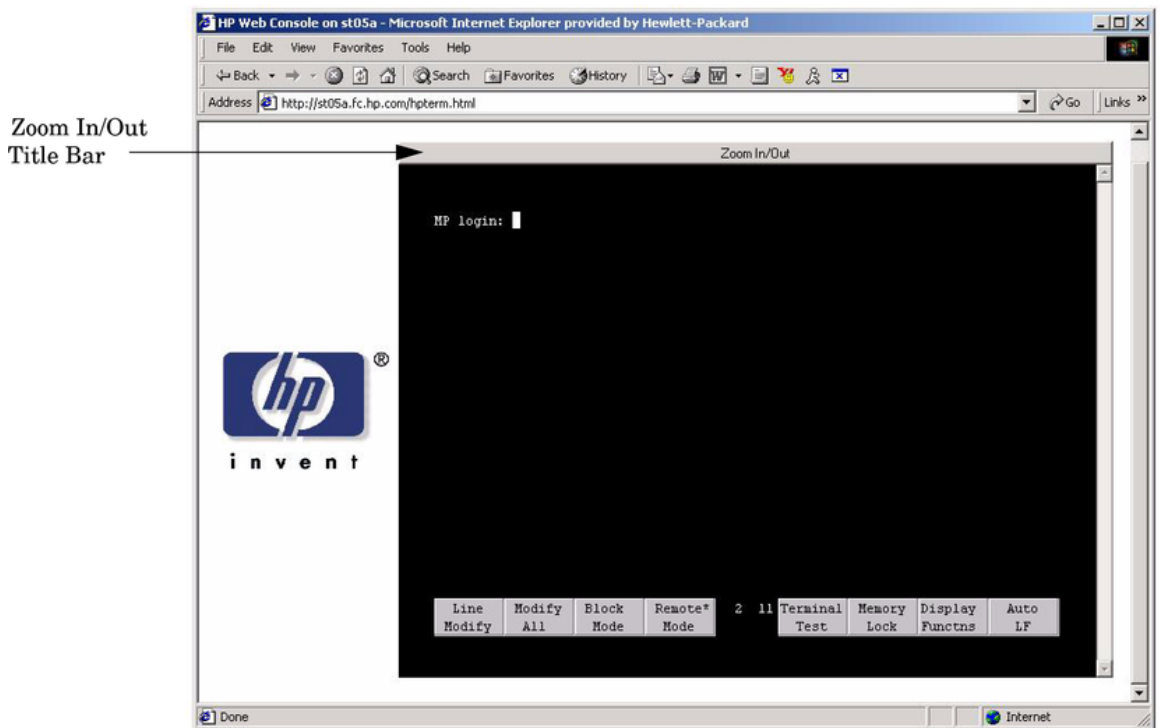
The following options are available for Web access:

```
1 - Web access disabled
2 - Web access enabled
3 - Secure web access enabled
```

Select option:

5. Launch a web browser on the same subnet using the IP address for the MP LAN port.

Figure 4-11 Browser Window



6. To generate a full screen MP window, click anywhere on the Zoom In/Out title bar.
7. Select the emulation type you want to use.
8. Login to the MP when the login window appears.

You now have access to the MP through a web browser.

Verifying the Presence of the Cell Boards

To perform this activity, either connect to the MP using a console, or connect the CE Tool (laptop) to the RS-232 local port on the MP.

After logging in to the MP, verify that the MP detects the presence of all the cells installed in the cabinet. It is important for the MP to detect the cell boards. If it does not, the partitions will not boot.

To determine if the MP detects the cell boards, follow these steps:

1. At the MP prompt, enter **cm**.

This displays the Command Menu. The Command Menu enables viewing or modifying the configuration and viewing the utilities controlled by the MP.

- To view a list of the commands available, enter **he**.
- To see more than one screen of commands, press **Enter**.
- To view the previous or next screen of commands, use the **Page Up** and **Page Down** keys.
- To exit the Help Menu, enter **q**.

2. From the command prompt (MP:CM>), enter **du**.

The du command displays the MP bus topology. A screen similar to the following displays:

Figure 4-12 The du Command Screen

```
MP:CM> DU

The following MP bus devices were found:
+-----+-----+-----+-----+-----+-----+
|   |   |   |   |   |   |   |   |   |   |   |   |
|   |   | Sys |   | PCI |   | BPS |   |   |   |   |   |
| Cab| MP | Bkpln| Cells| Domain|   |   |   |   |   |   |   |
| #  |   |   |   |   |   |   |   |   |   |   |   |
+-----+-----+-----+-----+-----+-----+
| 0  | *  | *  | * * | * * | * * | * * |   |   |   |   |
+-----+-----+-----+-----+-----+-----+

MP:CM>
```



NOTE: An asterisk (*) displays in the MP column.

3. Verify that there is an asterisk (*) for each of the cells installed in the cabinet, by comparing what is in the Cells column with the cells physically located inside the cabinet.

Figure 4-12 shows that cells are installed in slots 0 and 1. In the cabinet, cells should be physically located in slots 0 and 1.

Booting the HP 9000 rp7420 Server

After powering on the MP, +3.3 V housekeeping power, and verifying that the MP detects the presence of the cell boards, power on the server.

If using a LAN crossover cable with the laptop, review server activity for each partition configured, while the server powers on and boots. Windows can be opened for the complex and for each partition. HP recommends that at least two windows be opened:

- A window showing all activity in the complex. Following the installation procedure in this manual causes a window to be open at startup.

To display activity for the complex, follow these steps:

1. Open a separate Reflection window and connect to the MP.
2. From the MP Main Menu, select the VFP command with the s option.

- A window showing activity for a single partition.

To display activity for each partition as it powers up, follow these steps:

1. Open a separate Reflection window and connect to the MP.

2. Select the VFP command and select the desired partition to view.
There should be no activity on the screen at this point in the installation process.



NOTE: More than one window cannot be opened using a serial display device.

To power on the server, follow these steps:

1. Switch the power switch at the front of the server to On. The following occurs:
 - Power is applied to the server.
 - PDC starts to run on each cell.
 - The cell self test executes.
 - Hardware initializes for the server.
 - Console communication is established.
2. When activity on the Reflection screen stops, return to the MP Main Menu by entering **Ctrl-B**.
3. To enter console mode, enter **co**.
4. Enter the partition number of the partition to boot.
5. Press **Enter**.

Selecting a Boot Partition Using the MP

At this point in the installation process, the hardware is set up, the MP is connected to the LAN, the AC and DC power have been turned on, and the self test is completed. Now the configuration can be verified.

After the DC power on and the self test is complete, use the MP to select a boot partition.

1. From the MP Main Menu, enter **cm**.
2. From the MP Command Menu, enter **bo**.
3. Select the partition to boot.
Partitions can be booted in any order.
4. Return to the MP Main Menu by entering **ma** from the Command Menu
5. Go to the Console Menu by entering **co** at the MP Main Menu.

Exiting the MP automatically returns you to the Boot Console Handler main menu.

Verifying the System Configuration using Boot Console Handler

From the BCH main menu, enter **in** to go the Information Menu. Use the corresponding command from the menu to verify the type and quantity of processors, memory, and I/O cards:

- **pr** (processors)
- **me** (memory)
- **io** (to determine if the values match the devices installed in the server, check the PCI device information)

Once the parameters have been verified, use the **ma** command to return to the BCH Main Menu.

Booting HP-UX using Boot Console Handler

If your ordered Instant Ignition, HP-UX is installed in the factory at the Primary Path address. If HP-UX is at a path other than the Primary Path, use the **pa** (path) command, from the Configuration Menu, to set the boot path.

To set the boot path, follow these steps:

1. Main Menu: Enter command or Menu> **co**
2. Configuration Menu> **pa pri xx/xx/xx**

3. Configuration Menu> **ma**

Once the Primary Path has been set, use the **bo** (boot) command, from the Main Menu, to boot HP-UX.

4. Main Menu: Enter command or Menu> **bo pri**

5. The following prompt displays:

Do you wish to stop at the ISL prompt prior to booting (y/n)?

Enter **n**.



NOTE: If the partition fails to boot or if the server was shipped without Instant Ignition, booting from a DVD that contains the operating system and other necessary software might be required.

Adding Processors With Instant Capacity On Demand

The Instant Capacity On Demand (iCOD) program provides access to additional CPU resources beyond the amount that was purchased for the server. This provides the ability to activate additional CPU power for unexpected growth and unexpected spikes in workloads. Internally, iCOD systems physically have more CPUs, called iCOD CPUs, than the number of CPUs actually purchased. These iCOD CPUs reside in the purchased system, but they belong to HP and therefore are HP assets. A nominal “Right-To-Access Fee” is paid to HP for each iCOD processor in the system. At any time, any number of iCOD CPUs can be “activated.” Activating an iCOD CPU automatically and instantaneously transforms the iCOD CPU into an instantly ordered and fulfilled CPU upgrade that requires payment. After the iCOD CPU is activated and paid for, it is no longer an iCOD CPU, but is now an ordered and delivered CPU upgrade for the system.

The most current information on installing, configuring, and troubleshooting iCOD can be found at <http://docs.hp.com>.



NOTE: You need to be aware of the iCOD email requirements. For further details, see <http://docs.hp.com>.

Using the Checklist

The following checklist is an installation aid and should be used only after you have installed several systems using the detailed procedures described in the body of this manual. This checklist is a compilation of the tasks described in this manual, and is organized as follows:

PROCEDURES The procedures outlined in this document in order

IN-PROCESS The portion of the checklist that enables you to comment on the current status of a procedure

COMPLETED The final check to ensure that a step has been completed and comments

Major tasks are in **bold type**, sub tasks are indented.

Table 4-2 Factory-Integrated Installation Checklist

PROCEDURE	IN-PROCESS		COMPLETED	
	Initials	Comments	Initials	Comments
Obtain LAN information				
Verify site preparation				
Site grounding verified				
Power requirements verified				
Check inventory				

Table 4-2 Factory-Integrated Installation Checklist *(continued)*

PROCEDURE		IN-PROCESS		COMPLETED	
Inspect shipping containers for damage					
Unpack SPU cabinet					
	Allow proper clearance				
	Cut polystrap bands				
	Remove cardboard top cap				
	Remove corrugated wrap from the pallet				
	Remove four bolts holding down the ramps and remove the ramps				
	Remove antistatic bag				
	Check for damage (exterior and interior)				
	Position ramps				
	Roll cabinet off ramp				
Unpack the peripheral cabinet (if ordered)					
Unpack other equipment					
Remove and dispose of packaging material					
Move cabinet(s) and equipment to computer room					
Move cabinets into final position					
	Position cabinets next to each other (approximately 1/2 inch)				
	Adjust leveling feet				
	Install anti-tip plates				
	Inspect cables for proper installation				
Set up CE tool and connect to Remote RS-232 port on MP					
Apply power to cabinet (housekeeping)					
Check power to BPSs					
Log in to the MP					
Set LAN IP address on the MP					
Connect customer console					
Set up network on customer console					
Verify LAN connection					

Table 4-2 Factory-Integrated Installation Checklist *(continued)*

PROCEDURE	IN-PROCESS		COMPLETED	
Verify presence of cells				
Power on cabinet (48 V)				
Verify system configuration and set boot parameters				
Set automatic system restart				
Boot partitions				
Configure remote login (if required). See Appendix B.				
Verify remote link (if required)				
Install non-factory, integrated I/O cards (if required)				
	Select PCI card slot			
	Install PCI card			
	Verify installation			
Route cables using the cable management arm				
Install other peripherals (if required)				
Perform visual inspection and complete installation				
Set up network services (if required)				
Enable iCOD (if available)				
Final inspection of circuit boards				
Final inspection of cabling				
Area cleaned and debris and packing materials disposed of				
Account for tools				
Dispose of parts and other items				
Make entry in Gold Book (recommended)				
Customer acceptance and signoff (if required)				

5 Troubleshooting

This chapter contains information about the various status LEDs on the HP 9000 rp7420 server and other troubleshooting information.

Common Installation Problems

The following sections contain general procedures to help you locate installation problems.



CAUTION: Replace the top cover before operating the server, even for a short time. Otherwise, overheating can damage chips, boards, and mass storage devices. However, you can safely remove the PCI access panel while the server is running to remove and replace PCI hot-plug cards. For any other service activity requiring access to the processor baseboard or I/O backplane, power the server off, and observe all safety precautions.

Most problems are the result of incorrect system and SCSI subsystem configurations.

To troubleshoot an installation problem, perform the following checks in the order given:

1. Check all cable and power connections, including those in the rack, and so on.
2. Ensure the server is configured properly.
Check the Setup Utility. If the error is a network-related problem, determine if the server has enough memory and hard disk drive capacity.
3. Verify all cables and boards are securely plugged in to the appropriate connectors or slots.
4. Remove all extra options, such as disk drives, one at a time, checking the affect of each on the server.
5. Unplug the power cords, wait 20 seconds, plug-in the power cords and restart the server.
6. If a hardware error is suspected, follow these steps:
 - a. Log users off the LAN and power off the server.
 - b. Extend the server out of the rack and remove the top cover.
 - c. Simplify the server to the minimum configuration.
 1. The minimum configuration consists of the following:
 - One cell
 - Two processors
 - One quad of memory DIMMS (size 256 MB or larger)
 - One MP/SCSI card
 - One LAN/SCSI card
 - System backplane
 - PCI-X backplane
 - One BPS
 - Two PCI power modules
 - Two power cords
7. Remove all third-party options and reinstall them one at a time, checking the server after each installation.
8. Replace the top cover and reconnect the cables. Boot the server.

If the server does not function properly, see “The Server Does Not Power On” (page 67).

The Server Does Not Power On

To check for power related problems, follow these steps:

1. Check each BPS LED.

The LED is located in the lower left hand corner of the power supply face. Table 5-3 shows the states of the BPS LEDs.

A yellow LED indicates that the line cord connections are not consistent with the `pwrgrd` settings.

2. Verify that the power supply and both power cords are plugged in to the chassis.

The Server Powers On Then Shuts Off With a Fault Light

Use this checklist to check for the following problems when the server powers on and then off:

1. Ensure that a conductive item has not been dropped or left inside the server chassis.
2. Check the connections on all boards.
3. Check the system backplane for bent pins.

Use the `ps` command at the Command Menu to display detailed power and hardware status for selected system hardware.

Cell Board Extraction Levers

It is important that both extraction levers on the cell board be in the locked position. Both levers must be locked in order for the MP to recognize that the cell board is powered on and functioning properly.

Power to the cell board should only be removed using the `MP:CM> PE` command or by shutting down the partition or server. Therefore, if the levers become unlocked, the partition will not have a chance to logically shut down, and damage could occur to the operating system.

If the cell board is powered on and one lever becomes unlocked, the cell board stays powered on. However, if the cell board is powered off, it does not power on until the cell board is extracted, reinserted, and both levers are in the locked position.

The lever status can be determined by issuing the `MP:CM> DE` command and viewing the power status of the cell board controller (PDHC). The “ready” bit is true only when both levers are locked and all VRMs are installed. Use this status to determine if both levers are locked, and the cell board is properly installed in the chassis. For a sample of the output, see Figure 5-1. If the state is `RDY` (all caps), it means that the “ready bit” is true. If the state is `rdy` (lower case) it means that the “ready bit” is false. The meaning of each of these states is listed below.

Figure 5-1 de Command Output

```

MP:CM> de
Display summary status of the selected MP device.

  B - BPS  <Bulk Power Supplies>
  U - CLU  <Cabinet Utilities: Fans, Intrusion, Clock's etc.>
  A - PACI <Partition Console Interface>
  G - MP   <Management Processor>
  P - PM   <Power Management>
  H - Cell Board Controller <PDHC>
    Select device: h
    Enter cell number: 1

Cell Controller <PDHC> status. Cell 1
FW Revision   : 3.006 built FRI AUG 15 12:01:54 2003
MICE Revision : 1.0

PDHC state      : 0x3b <err hib SMG CCO cci I2C PWR>
Attention Led is off

Power Status   : 0x7c <12USTBY RDY EN PWR vflt tflt fanflt>
LED State      : 0x0e <BIB SMG I2C heartbeat>

IO Connection Status      : 0x01 <Connection OK>
IO Chassis Phys Location  : 0x01 <cabinet=0, PCI Backplane=0, PCI Domain=1>
Core Cell Number         : 0x81 <cabinet=0, cell=1, Ualid>

Temp Fault Status : 0x00 <cpu0 cpu1 cpu2 cpu3 mmu cell>
CPU 0 Temp        : 47 deg C
CPU 1 Temp        : 0 deg C
CPU 2 Temp        : 59 deg C
CPU 3 Temp        : 0 deg C
MMU Temp          : 30 deg C
Cell Board Temp    : 28 deg C

Fan Status       : 0x00cc <See PS command for detail>
Local I2C Bus Status : 0x00 <OK>

MP:CM>

```

Ready Bit (RDY) is set to true

Table 5-1 Ready Bit States

Ready Bit State	MP:>CM DE command status	Meaning
True	RDY (upper case)	All cell VRMs installed, and both cell latches are locked.
False	rdy (lower case)	One or more VRMs not installed or failed, and/or one or more cell latches not locked.

LED Indicators

The server has LEDs that indicate the health of the server. This section defines those LEDs.

Front Panel LEDs

There are seven LEDs located on the front panel. Figure 5-2 shows the front panel LEDs, and Table 5-2.

Figure 5-2 Front Panel with LED Indicators

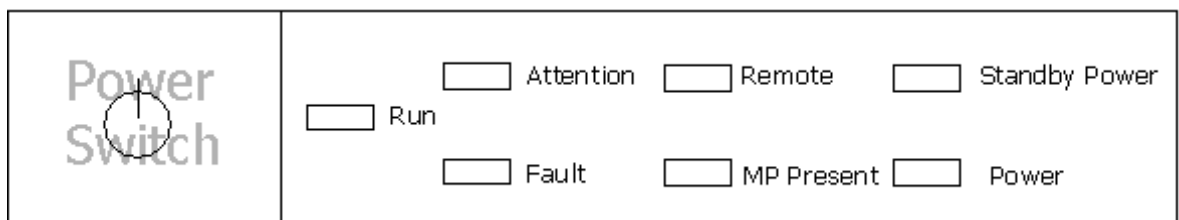


Table 5-2 Front Panel LEDs

LED	Driven By	State	Description
Power	GPM ¹	On Green	48 V good (LED works even if MP is not installed, or installed and not active)
		Off	48 V off
Standby Power	GPM	On Green	3.3 V standby good (LED works even if MP is not installed, or installed and is not active)
		Off	3.3 V standby off
MP Present	GPM	On Green	At least one MP is installed and active
		Off	No MPs are installed or at least one is installed but not active
Remote	MP through GPM	On Green	Dial-in (remote) console enabled
		Off	Dial-in (remote) console is disabled, or MP is not installed, or MP is installed and not active
Attention	MP through GPM	Flash Yellow	Chassis log alert unread
		Off	No alert, or MP is not installed, or MP installed and is not active
Run	PDC/MP through GPM	On Green	One or more partitions running
		Off	No partition running, or MP is not installed, or MP is installed and not active
Fault	PDC/MP through GPM	Flash Red	One or more partitions have reported a fault
		Off	No partitions running, or the MP is not installed, or the MP is installed and not active

1 GPM stands for global power monitor

Bulk Power Supply LEDs

There is a single three-color LED on each BPS.

Figure 5-3 BPS LED Locations

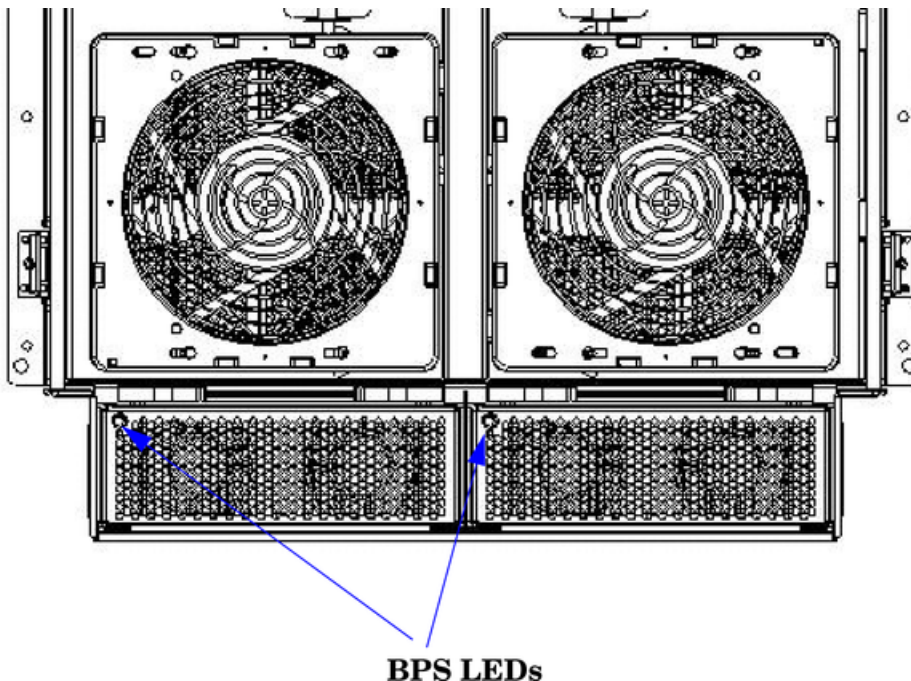


Table 5-3 BPS LEDs

LED Indication	Description
Blinking Green	BPS is in standby state with no faults or warnings
Green	BPS is in run state (48 volt output enabled) with no faults or warnings
Blinking Yellow	BPS is in standby or run state with warning(s) present but no faults
Yellow	BPS is in standby state with recoverable fault(s) present but no non-recoverable faults
Blinking RED	BPS state might be unknown, non-recoverable fault(s) present
Red	Not used
Off	BPS fault or failure, no power cords installed or no power to the chassis

PCI Power Supply LEDs

There are three LEDs on the PCI power supply. Green and yellow LEDs follow OL* operation. A multi-color LED reports warnings and faults.

Figure 5-4 PCI Power Supply LED Locations

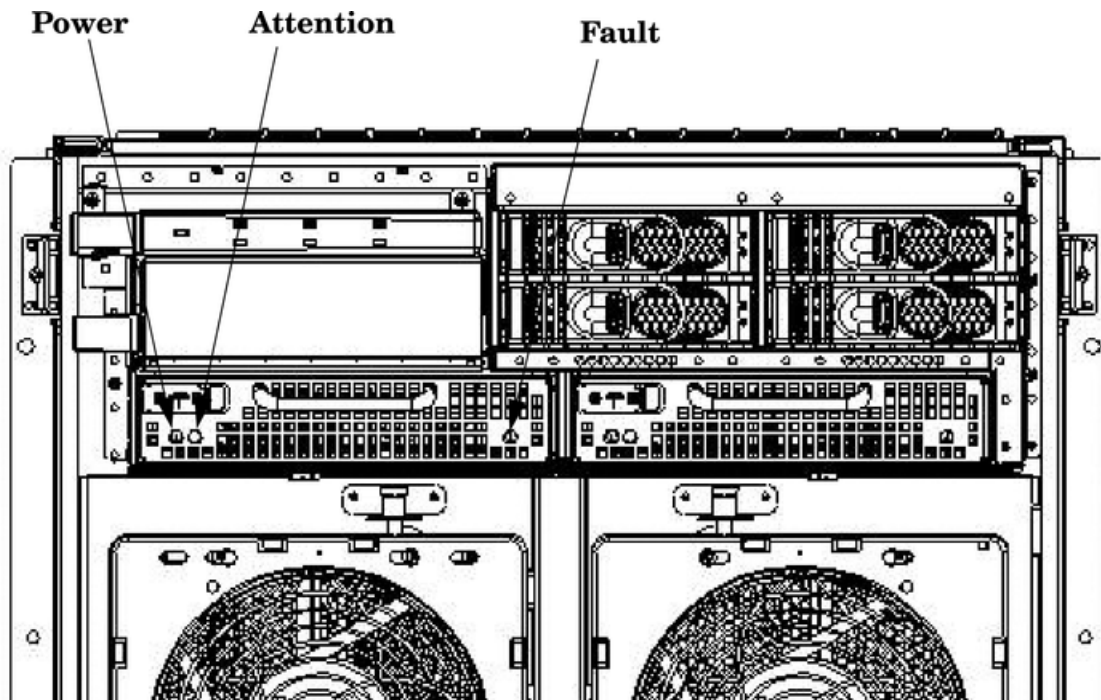


Table 5-4 PCI Power Supply LEDs

LED	Driven By	State	Description
Power	Each supply	On Green	All output voltages generated by the power supply are within limits.
		Off	Power to the I/O chassis or the entire system has been removed.
Attention	MP through PCI LPM ¹	Yellow	See Table 5-9 for LED status in combination with the green power LED for PCI-X slot status.

Table 5-4 PCI Power Supply LEDs (continued)

LED	Driven By	State	Description
Fault	Each supply	Flash Yellow	The temperature within the power supply is above the lower threshold.
		On Yellow	The temperature of the power supply is approaching the thermal limit
		Flash Red	Power supply has shut down due to an over temperature condition, a failure to regulate the power within expected limits, or a current-limit condition.
		Off	Normal operation.

1 LPM stands for local power monitor.

System and PCI I/O Fan LEDs

There is a single three-color LED on each system and PCI I/O fan.

Figure 5-5 Front, Rear and PCI I/O Fan LEDs

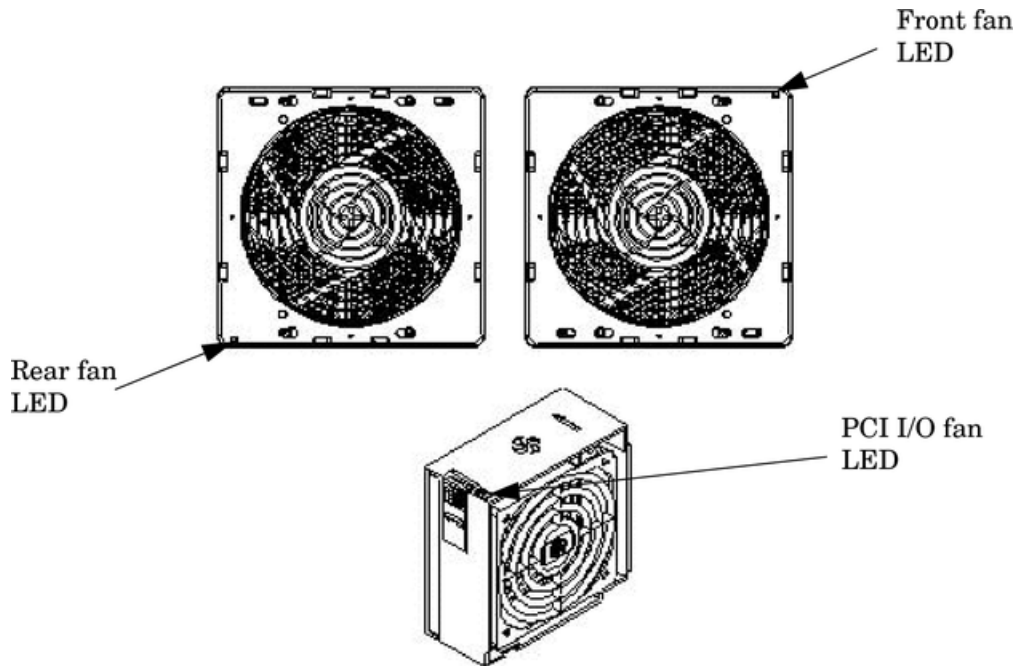


Table 5-5 System and PCI I/O Fan LEDs

LED	Driven By	State	Description
Fan Status	Fan	On Green	Normal
		Flashing Yellow	Predictive failure
		Flashing Red	Failed
		Off	No power

OL* LEDs

Cell Board LEDs

There is one green power LED located next to each ejector on the cell board in the server that indicates the power is good. When the LED is illuminated green, power is being supplied to the cell board and it is unsafe to remove the cell board from the server.

There is one yellow attention LED located next to each ejector on the cell board in the server. When the LED is flashing yellow, it is safe to remove the cell board from the server.

Figure 5-6 Cell Board LED Locations

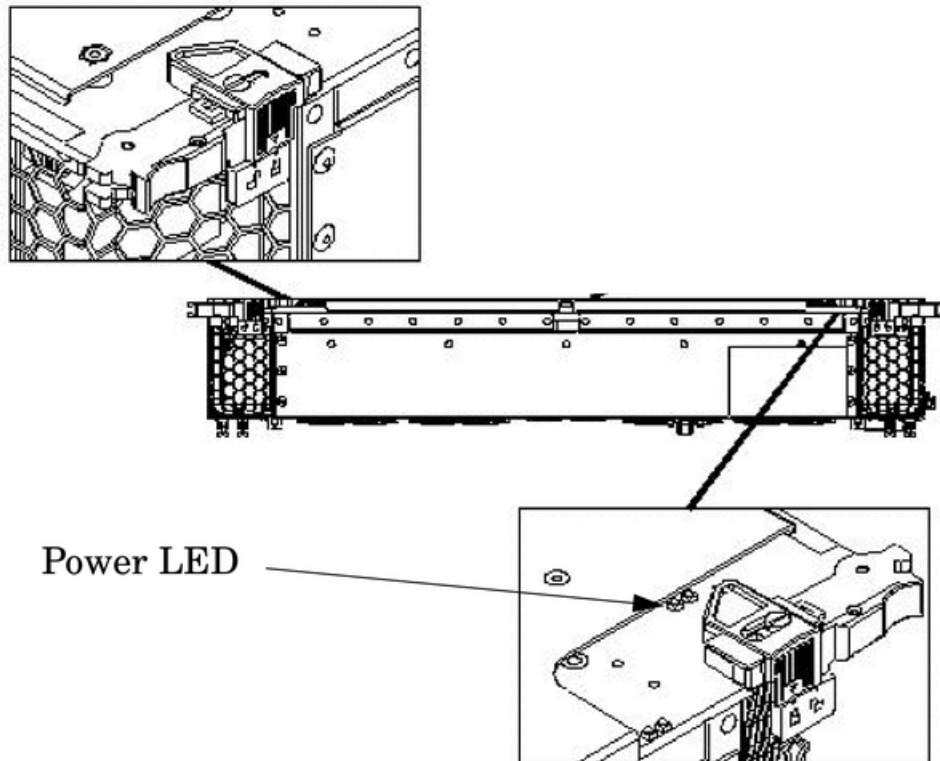


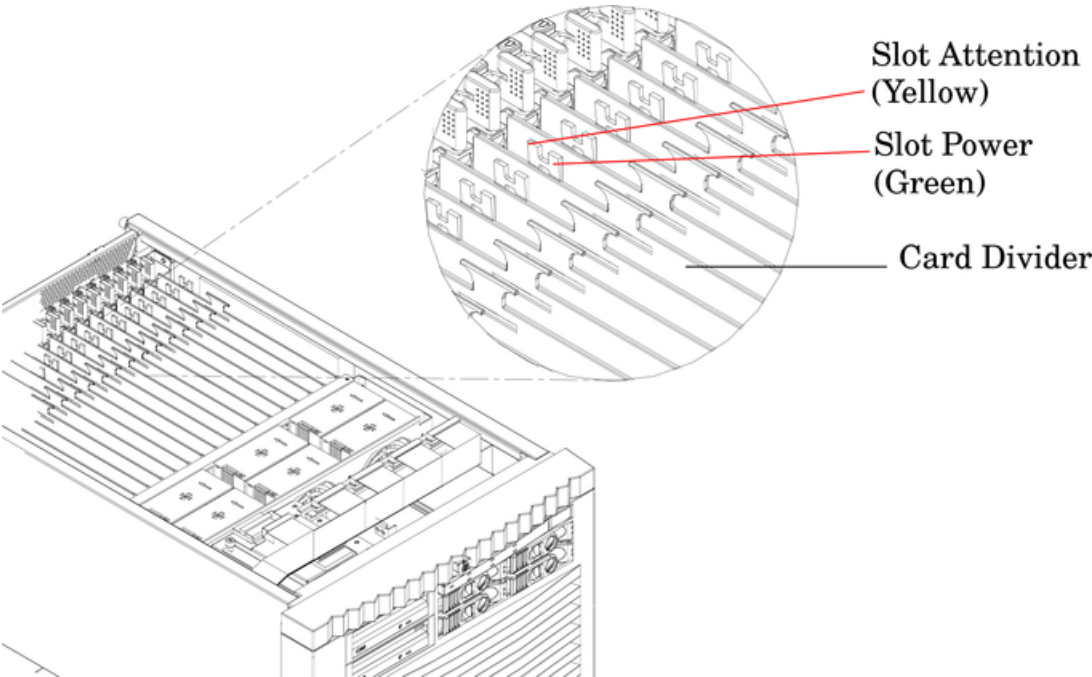
Table 5-6 Cell Board OL* LED Indicators

Location	LED	Driven by	State	Description
On cell board (located in the server cabinet)	Power	Cell LPM	On Green	3.3 V Standby and Cell_Pwr_Good
			Off	3.3 V Standby off, or 3.3 V Standby on and no Cell_Pwr_Good
	Attention	MP through GPM	Flash Yellow	Safe to remove the cell board from the system

PCI OL* Card Divider LEDs

The PCI OL* card LEDs are located on each of the 16 PCI-X slot dividers in the PCI-X chassis area. The green power LED indicates whether power is supplied to the card slot. The yellow attention LED states are defined in Table 5-9.

Figure 5-7 PCI OL* LED Locations



Core I/O LEDs

The core I/O LEDs in Table 5-7 (page 75) are located on the bulkhead of the installed core I/O PCA.

Figure 5-8 Core I/O Card Bulkhead LEDs

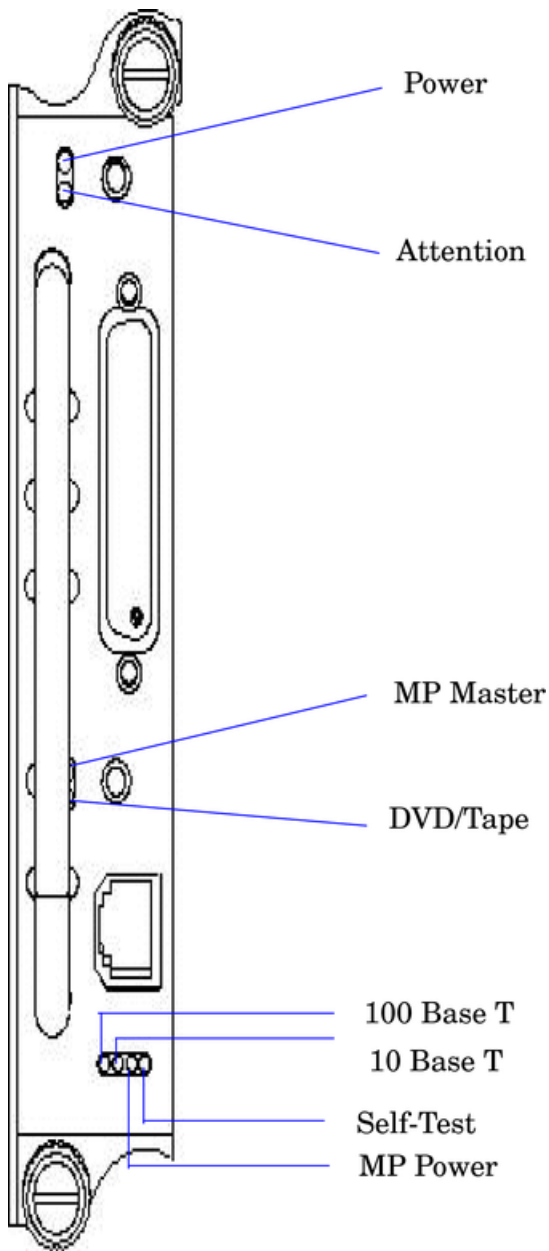


Table 5-7 Core I/O LEDs

LED (as silk-screened on the bulkhead)	State	Description
Power	On Green	I/O power on
Attention	On Yellow	PCI attention
MP Master	On Green	Core I/O is managing the system
DVD/Tape	On Green	Core I/O is managing the DVD/Tape
Self-Test	On Yellow	Failure during POST
MP LAN Act	On Green	MP LAN activity
MP LAN 10 BT	On Green	MP LAN in 10 BT mode
MP LAN 100 BT	On Green	MP LAN in 100 BT mode

Core I/O Buttons

There are two recessed buttons on the back of the core I/O card, as explained in Table 5-8.

Figure 5-9 Core I/O Button Locations

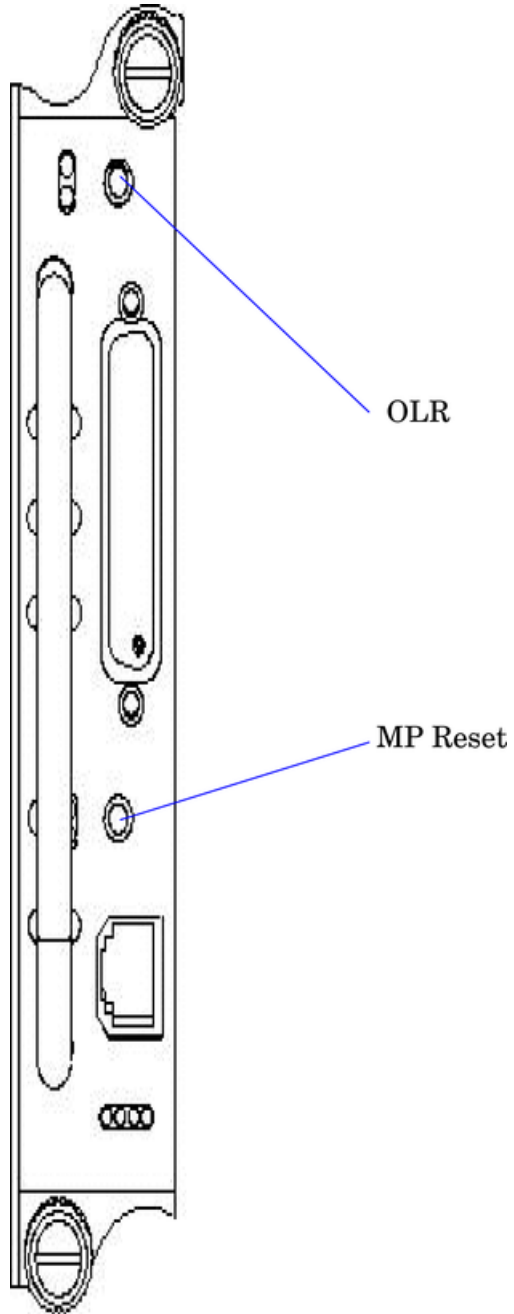


Table 5-8 Core I/O Buttons

Button Identification (as silk-screened on the bulkhead)	Location	Function
MP RESET	Center of the core I/O card	Resets the MP NOTE: If the MP RESET button is held for longer than five seconds, it clears the MP password and reset the LAN, RS-232 (serial port), and modem port parameters to their default values. LAN Default Parameters <ul style="list-style-type: none"> • IP Address—192.168.1.1 • Subnet mask—255.255.255.0 • Default gateway—192.168.1.1 • Hostname—gsp0 RS-232 (Serial Port) Default Parameters <ul style="list-style-type: none"> • 9600 baud • 8 bits • No parity Remote/Modem Port Parameters <ul style="list-style-type: none"> • Disabled
OLR (Symbol next to button is shown below) ■	Top end of the core I/O card	Request OL* for this core I/O slot NOTE: The OLR function is not enabled for the core I/O card.

PCI-X Hot-Plug LED OL* LEDs

Table 5-9 OL* LED States

State	Power (Green)	Attention (Yellow)
Normal operation, slot power on	On	Off
Slot selected, slot power on	On	Flashing
Slot needs attention, slot power on	On	On
Slot available, slot power off	Off	Off
Ready for OL*, slot power off	Off	Flashing
Fault detected, slot power off	Off	On
Slot powering off or on	Flashing	Off

Disk Drive LEDs

There are two tri-color LED on each disk drive.

Figure 5-10 Disk Drive LED Location

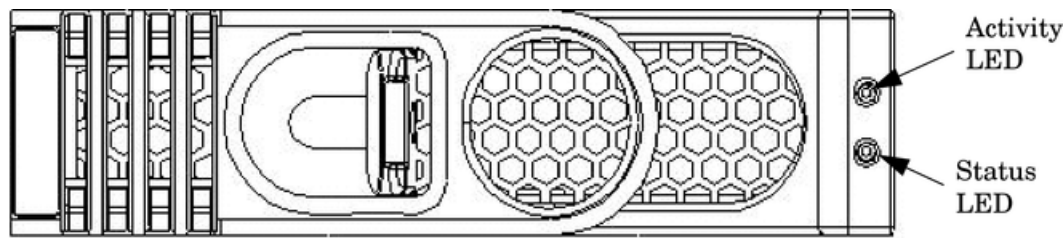


Table 5-10 Disk Drive LEDs

Activity LED	Status LED	Flash Rate	Description
Off	Green	Steady	Normal operation, power applied
Green	Off	Steady	Green stays on during foreground drive self-test
Green	Off	Flutter at rate of activity	I/O Disk activity
Off	Yellow	Flashing at 1 Hz or 2 Hz	Predictive failure, needs immediate investigation
Off	Yellow	Flashing at 0.5 Hz or 1 Hz	Operator inducing manually
Off	Yellow	Steady	Module fault, critical
Off	Off	LEDs off	Unit not powered or installed

Server Management Subsystem Hardware Overview

Server management for the HP 9000 rp7420 server is provided by an MP on the core I/O board. The server management hardware is powered by standby power that is available whenever the server is plugged into primary AC power. This enables service access even if the DC power to the server is switched off.

The MP communicates with the server subsystems, sensors, and PDC by internal buses. It also communicates with the operating console and session gettys by universal asynchronous receiver-transmitters (UARTs) on the core I/O PCI bus.

Connection to the management processor is by way of two I/O paths:

- An RS-232 port for a local terminal
- An RS-232 port for a modem connection
- A 10/100/1000 baseT LAN port (Web console)

When the server is configured with one core I/O board, that board must be in slot 0, since the primary MP is always the MP on the core I/O board in slot 0.

When the server is configured for two partitions, it must contain two core I/O boards, one for each partition. It also contains two MPs. In this case, the MP in slot 0 is the primary MP and provides all of the server management functions. The MP on the core I/O board in slot 1 is a secondary MP and redirects the operating system gettys to the primary MP over an internal MP-to-MP link. All external connections to the MP must be to the primary MP in slot 0. The secondary MP ports are disabled.

For high availability (HA), the server powers on and powers off without an MP. Booting HP-UX without an MP depends on the ability of the operating system to boot without a console getty. Thus, in a two-partition system, the partition with a failed MP might not boot, since the MP provides the console getty.

The server configuration cannot be changed without the MP.

Resetting the MP through a modem connection can cause Admin^{^M} to display on every **Enter** keystroke. Attempting a modem reset (MP command MR) does not clear this incorrect response. This is not experienced with a telnet connection.

To regain control with a new Login prompt, follow these steps:

1. Enter **Admin** (case sensitive) and press **< enter > < ctrl + enter >** keys.
2. A new Login prompt is created.
3. To move on to the Password prompt, re-enter **Admin < ctrl + enter >**.
4. To reach the Main Menu, enter **Admin < ctrl + enter >**.

This fixes the ^{^M} problem. The issue returns if the MP is reset through the modem.

Server Management Overview

Server management consists of four basic functional groups:

- Chassis management
- Chassis logging
- Console and session redirection
- Service access

Chassis Management

Chassis management consists of control and sensing the state of the server subsystems:

- Control and sensing of bulk power
- Control and sensing of DC-to-DC converters
- Control and sensing of fans
- Control of the front panel LEDs
- Sensing temperature
- Sensing of the power switch
- Sensing chassis intrusion
- Reading FRU PROMS

Chassis Logging

Chassis logging consists of maintaining logs of chassis codes:

- Boot codes
- Activity codes
- Error codes

Console and Session Redirection

Console and session redirection enables the console and session terminals to be connected over the RS-232 port, a modem, or a LAN connection (web console).

Service Access

Service access enables access to and control of the server state. Service access is secured by a password. Service access functions include the following:

- Access to chassis logs
- Configuration of partitions
- Control for online addition and replacement
- Access to the virtual front panel
- Transfer of control and reset

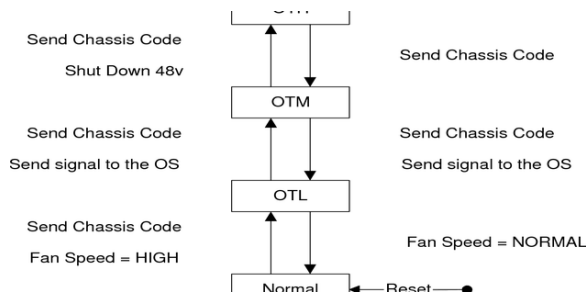
Server Management Behavior

This section describes how the system responds to over-temperature situations, how the firmware controls and monitors fans, and how it controls power to the server.

Thermal Monitoring

The manageability firmware is responsible for monitoring the ambient temperature in the server and taking appropriate action if this temperature becomes too high. To this end, the ambient temperature of the server is broken into four ranges: normal, overtemp low (OTL), overtemp medium (OTM), and overtemp high (OTH). Figure 5-11 shows the actions taken at each range transition. Actions for increasing temperatures are shown on the left; actions for decreasing temps are shown on the right.

Figure 5-11 Temperature States



On large temperature swings, the server transitions through all states in order. It might go to the following state immediately, but each of the preceding actions occur. If the temperature reaches the highest range, the server be shuts down immediately by the manageability firmware.

Fan Control

There are three sets of fans in the system: those on the I/O bay, the front and rear fans that are connected to the main backplane, and those on the cell boards. The front fans run on standby power, and run any time AC input power is supplied to the server. All of the fans turn on when 48 V power is supplied to the system.

As shown in Figure 5-11, the fan behavior is related to the temperature state. The fans go to high speed when the ambient temperature is anywhere above the normal operating range. The front and rear fans go to high speed any time a chassis intrusion switch is triggered when removing a side cover.

Altimeter Circuit

The PCI-X backplane contains an altimeter circuit. This circuit is used to adjust the chassis fan speeds for the operating altitude at power on and during MP initialization. The chassis fans consist of the nine front fans, twelve rear fans, and the six PCI-X I/O assembly fans. If an altimeter failure is detected, the information is logged as an Event ID then propagated to the OS level to be picked up by monitoring diagnostics.

The altimeter circuit is checked at power on by the MP. If an expected value is returned from the altimeter circuit, the altimeter is determined good. The altimeter reading is then set in non-volatile random access memory (NVRAM) on board the core I/O card. If the value is ever lost like for a core I/O replacement, the NVRAM will be updated at next boot provided the altimeter is functioning normally. If the altimeter has failed, and the stable storage value has been lost because of a core I/O failure or replacement, the MP will adjust the fan speeds for sea-level operation.



NOTE: Fans driven to a high RPM in dense air cannot maintain expected RPM and will be considered bad by the MP leading to a “False Fan Failure” condition.

Power Control

If active, the manageability firmware is responsible for monitoring the power switch on the front panel. Setting this switch to the ON position is a signal to the MP to turn on 48 V DC power to the server. The PE command can also be used to send this signal. This signal does not always generate a transition to the powered state. The following conditions prevent the manageability firmware from applying 48 V DC power to the server:

- Insufficient number of active bulk power supplies
- Insufficient number of I/O fans
- Insufficient number of main fans
- Ambient temperature is in an OVERTEMP HIGH condition

Unless one of the following conditions occurs, 48 V DC power to the server is maintained:

- A main fan failure causes there to be an insufficient number of main fans.
- A I/O fan failure causes there to be an insufficient number of I/O fans.
- Ambient temperature reaches an OVERTEMP HIGH condition.
- The front panel power switch is turned OFF.
- The PE command is issued to the manageability firmware to turn off power to the server cabinet.

Server Management Commands

For a list of the server management commands, go to the *iLO 2 Operations Guide* at <http://docs.hp.com>.

6 Removing and Replacing Server Components

This chapter describes how to shut down nPartitions, power off the server, and remove and replace hardware components in the server.

HP 9000 rp7420 Server Customer Replaceable Units

These procedures are intended for use by trained and experienced service personnel only.

Hot-Pluggable CRUs

A Customer Replaceable Unit is hot-pluggable if it can be removed from the chassis while the system remains operational, but requires software intervention before removing the CRU.

The following hardware components are hot-pluggable CRUs:

- Disk Drive
- PCI/PCI-X Card

Hot-Swappable CRUs

A CRU is hot-swappable if it can be removed from the chassis while the server remains operational and requires no software intervention before removing the CRU.

The following list identifies the hot-swappable CRUs in the HP 9000 rp7420 server.

- Front Smart Fan Assembly
- Rear Smart Fan Assembly
- PCI-X Fan Assembly
- BPS

Other CRUs

To remove and replace the CRUs that are neither hot-pluggable, nor hot-swappable, you must shut HP-UX off in the nPartition where the CRU resides, and you must power the CRU off before removing it. For detailed instructions, see “Powering Off Hardware Components and Powering On the Server” (page 84).

These CRUs include:

- CD/DVD/DAT Drive
- PCA Front Panel Board
- PCI Power Module

Safety and Environmental Considerations



WARNING! Before proceeding with any installation, maintenance, or service on a system that requires physical contact with electrical or electronic components, be sure that either power is removed or safety precautions are followed to protect against electric shock and equipment damage. Observe all WARNING and CAUTION labels on equipment. All installation and service work must be done by qualified personnel.

Communications Interference

HP system compliance tests are conducted with HP supported peripheral devices and shielded cables, such as those received with the system. The system meets interference requirements of all countries in which it is sold. These requirements provide reasonable protection against interference with radio and television communications.

Installing and using the system in strict accordance with HP's instructions minimizes the chances that the system will cause radio or television interference. However, HP does not guarantee that the system will not interfere with radio and television reception.

Take these precautions:

- Use only shielded cables.
- Install and route the cables according to the instructions provided.
- Ensure that all cable connector screws are firmly tightened.
- Use only HP supported peripheral devices.
- Ensure that all panels and cover plates are in place and secure before system operation.

Electrostatic Discharge

HP systems and peripherals contain assemblies and components that are sensitive to ESD. To prevent component damage from static electricity, carefully observe the precautions and recommended procedures in this manual.



CAUTION: Connect to ground with a wrist strap. Connection can be made to any grounded metal assembly in the cabinet. Both you and the electronic devices must be grounded to avoid static discharges that can cause damage.

To prevent component damage from static electricity, take these precautions:

- Prepare an ESD-safe work surface large enough to accommodate the various assemblies handled during the upgrade. Use a grounding mat and an anti-static wrist strap, such as those included in the ESD Field Service Kit, Part number A3024-80004.
- The anti-static bag cannot function as a static dissipating mat. Do not use the anti-static bag for any other purpose than to enclose a product.
- Treat all assemblies, components, and interface connections as static sensitive.
- When unpacking cards, interfaces, and other accessories that are packaged separately from the system, keep the accessories in the conductive plastic bags until they are ready to be installed.
- Avoid working in carpeted areas, and keep body movement to a minimum while installing accessories.

Powering Off Hardware Components and Powering On the Server

When you remove and replace hardware, you may need to power off hardware components as part of the remove and replace procedure.

This section gives details on how to power hardware components off and on.

Powering Off Hardware Components

To power off individual components or the entire cabinet, follow these steps:

1. Log in to the MP of the server.
2. If the component you will power off is assigned to an nPartition, then use the Virtual Front Panel (VFP) to view the current boot state of the nPartition.

You must shut down HP-UX on the nPartition before you power off any of the hardware assigned to the nPartition.

When you are certain the nPartition is not running HP-UX, you can power off components that belong to the nPartition.



NOTE: Partition configuration information is available on the HP website at <http://docs.hp.com>. For more detail, see the HP Systems Partition Guide: Administration for nPartitions.

3. Access the MP Command menu.
From the MP Main menu, enter **CM** to access the Command menu.
4. To check details about the hardware component you plan to power off, use the MP Command menu **PS** command.
The **PS** command enables you to check the status of the cabinet, system backplane, MP core I/O, PCI power domains—or bricks—in the I/O card cage, and cells.
5. Use the MP Command menu **PE** command to power off the hardware component.
You can power on or off the cabinet (including all cells and I/O in the cabinet) using the **PE** command, as well as individual cells along with their associated I/O domain, or PCI power domains (bricks).
Using the Command menu **PE** command to manage cabinet power is equivalent to using the front panel power switch.
6. If you need to disable all power in the entire cabinet, you also must disconnect all power cords to disable all housekeeping power.



IMPORTANT: Because of power redundancy capabilities, it is important that each power cord plug into its proper receptacle. Label all power cords to indicate which receptacle each cord plugs in to. Ensure that the cabinet power is powered off before disconnecting any power cords.

7. Perform the hardware removal and replacement procedure for the powered off component.

Powering On the Server

To power on the system after a repair, follow these steps:

1. If needed, reconnect all power cords to the appropriate receptacles and power on the system.
2. To power on the hardware component that was powered off and replaced, use the MP Command menu **PE** command.
3. To verify that power is enabled to the newly replaced part, use the **PS** command.

For example; enter **C** from within the **PS** command to select cell.

To power on the entire cabinet if power is absent from the part, enter the **PE** command and select **T**.



NOTE: You may need to allow time for some components to complete power on self test (POST) before a complete status is available.

4. Reboot each nPartition. See Appendix D “Operating System Boot and Shutdown”.



NOTE: Partition configuration information is available on the HP website at <http://docs.hp.com>. For more detail, see the HP Systems Partition Guide: Administration for nPartitions.

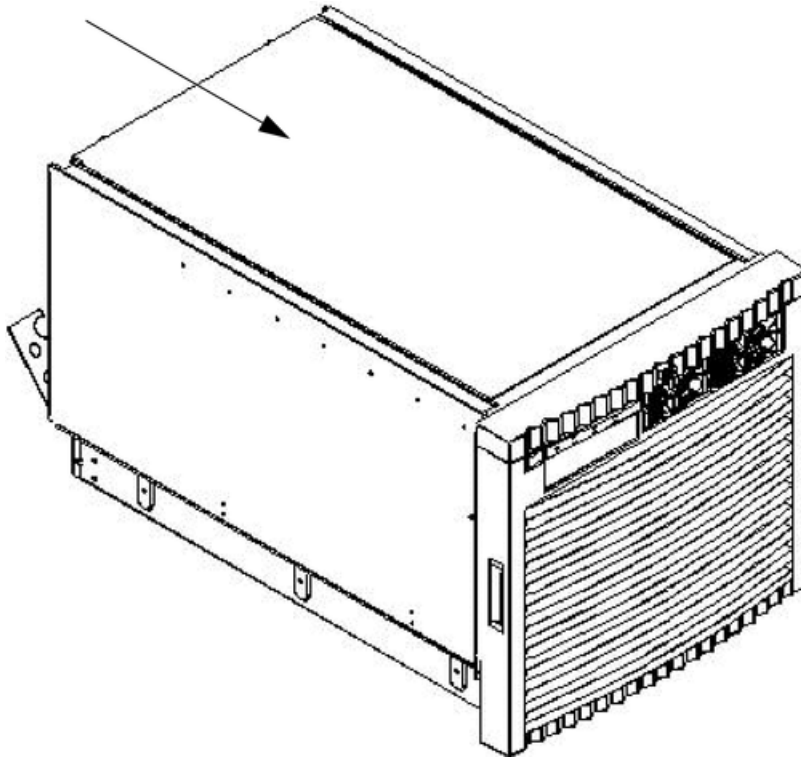
5. Verify system functionality by using the Online Diagnostic Support Tools Manager (STM) exerciser.

Removing and Replacing the Top Cover

It is necessary to remove and replace one or more of the covers to access the components within the server chassis.

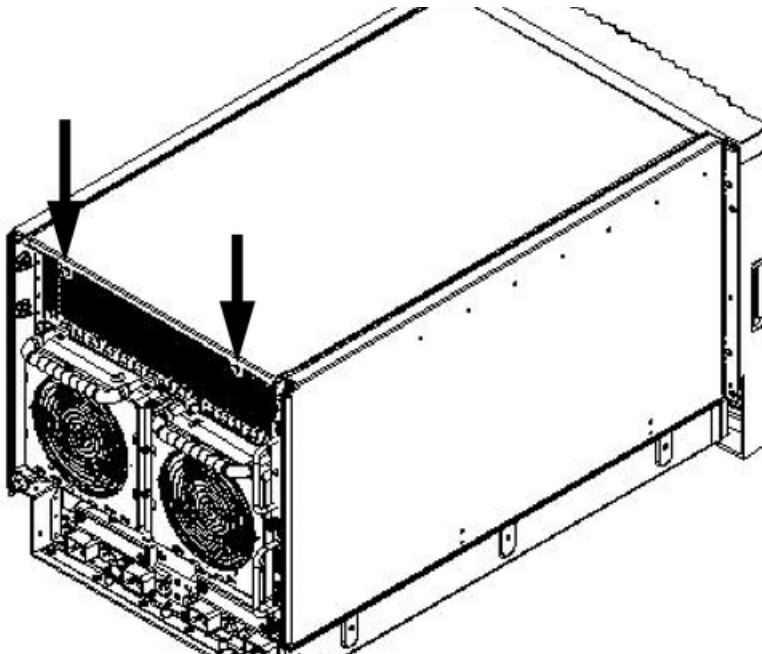
CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the server.

Figure 6-1 Top Cover



Removing the Top Cover

Figure 6-2 Top Cover Retaining Screws



To remove the top cover, follow these steps:

1. Loosen the retaining screws securing the cover to the rear of the chassis.
2. Slide the cover toward the rear of the chassis.
3. Lift the cover up and away from the chassis.

Replacing the Top Cover

To replace the top cover, follow these steps:

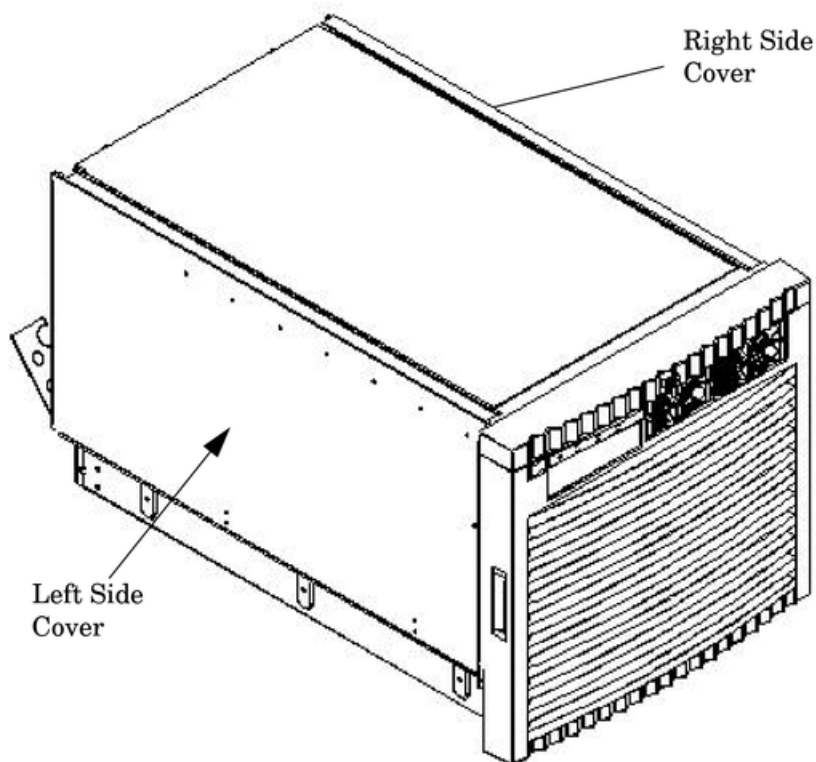
1. Slide the cover into position. It should easily slide into position. Use a slow, firm pressure to properly seat the cover.
2. Tighten the retaining screws to secure the cover to the chassis.

Removing and Replacing a Side Cover

It is necessary to remove and replace one or more of the covers to access the components within the server chassis.

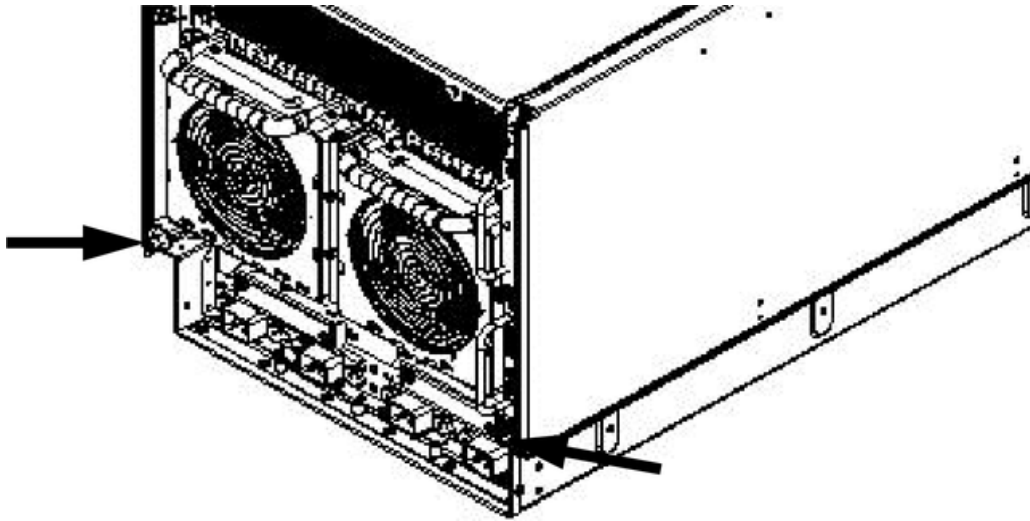
CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Figure 6-3 Side Cover Locations



Removing a Side Cover

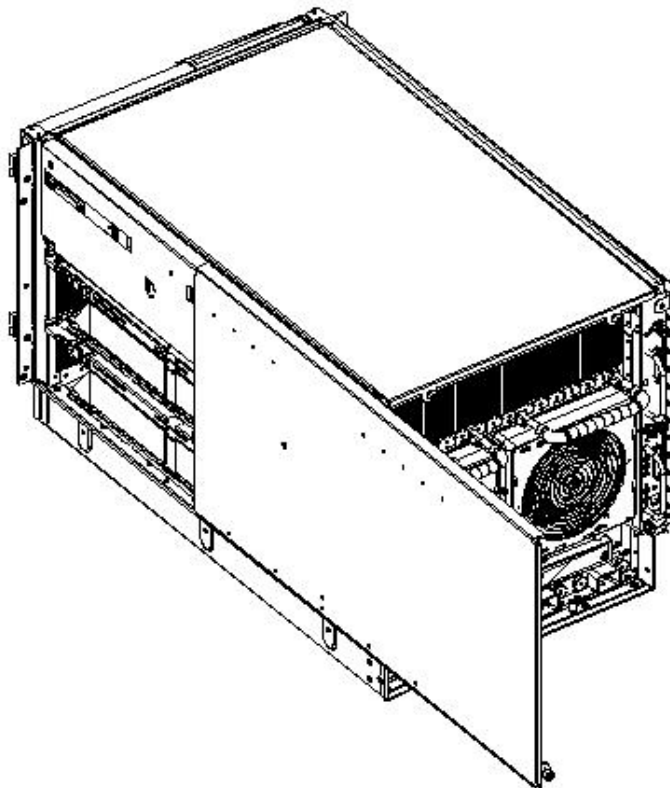
Figure 6-4 Side Cover Retaining Screw



To remove a side cover, follow these steps:

1. Loosen the retaining screw securing the cover to the chassis.
2. Slide the cover from the chassis.

Figure 6-5 Side Cover Removal Detail



Replacing a Side Cover

To replace a side cover, follow these steps:

1. Slide the cover in position. The cover easily slides into position.
2. To properly seat the cover, use a slow, firm pressure.

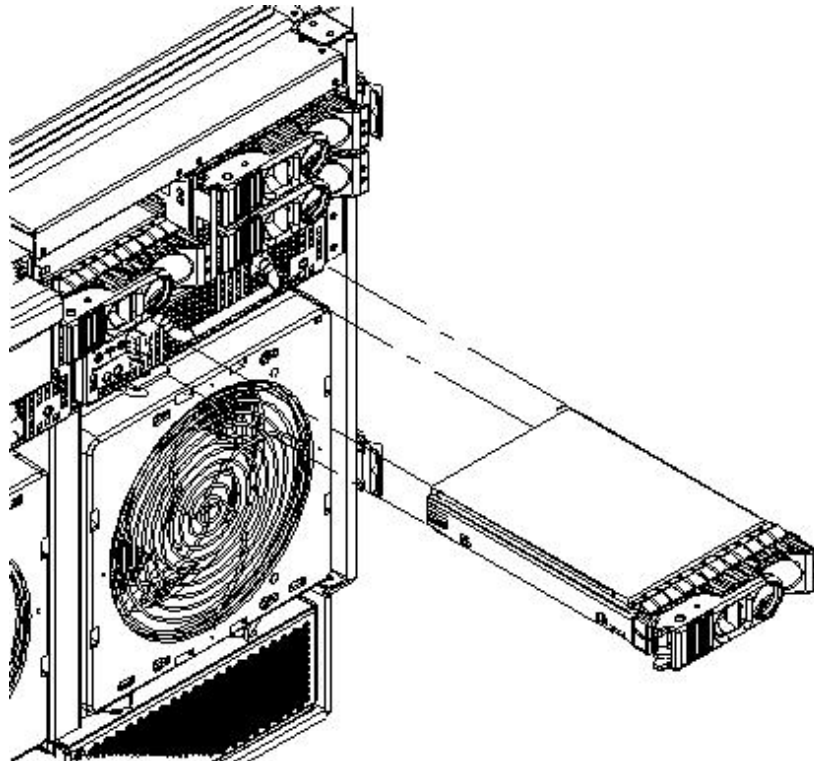
3. To secure the cover to the chassis, tighten the retaining screw.

Removing and Replacing a Disk Drive

The disk drives are located in the front of the chassis. The nPartition must be shut down to remove or replace the drive that serves as the boot disk, if the boot disk is not mirrored. See “Powering Off Hardware Components and Powering On the Server” (page 84) for more information. The remainder of the internal disk drives are hot-pluggable.

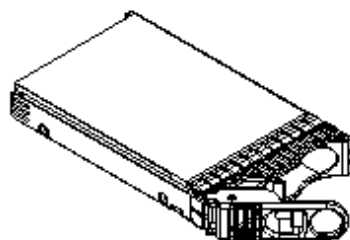
CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Figure 6-6 Disk Drive Location



Removing a Disk Drive

Figure 6-7 Disk Drive Detail



M001+
+ 3122

To remove a disk drive, follow these steps:

1. Disengage the front locking latch on the disk drive by pushing the release tab to the right and the latch lever to the left.
2. Pull forward on the front locking latch and carefully slide the disk drive from the chassis.

Replacing a Disk Drive

To replace a disk drive, follow these steps:



NOTE: Sometimes using the `diskinfo` and `ioscan` commands can produce cached data. Run these commands only after the disk drive has been removed.

1. Before installing the disk drive, enter the following command:

```
#diskinfo -v /dev/rdisk/cxtxdx
```
2. Enter the following command:

```
#ioscan -f
```

The response message after running this command is:
NO_HW
3. Be sure the front locking latch is open, then position the disk drive in the chassis.
4. Slide the disk drive into the chassis. Use a slow, firm pressure to properly seat the connection.
5. Depress the front locking latch to secure the disk drive in the chassis.
6. Spin up the disk by entering one of the following commands:

```
#diskinfo -v /dev/rdisk/cxtxdx
```

```
#ioscan -f
```

```
#pvcreate
```

```
#vgcfgrestore
```

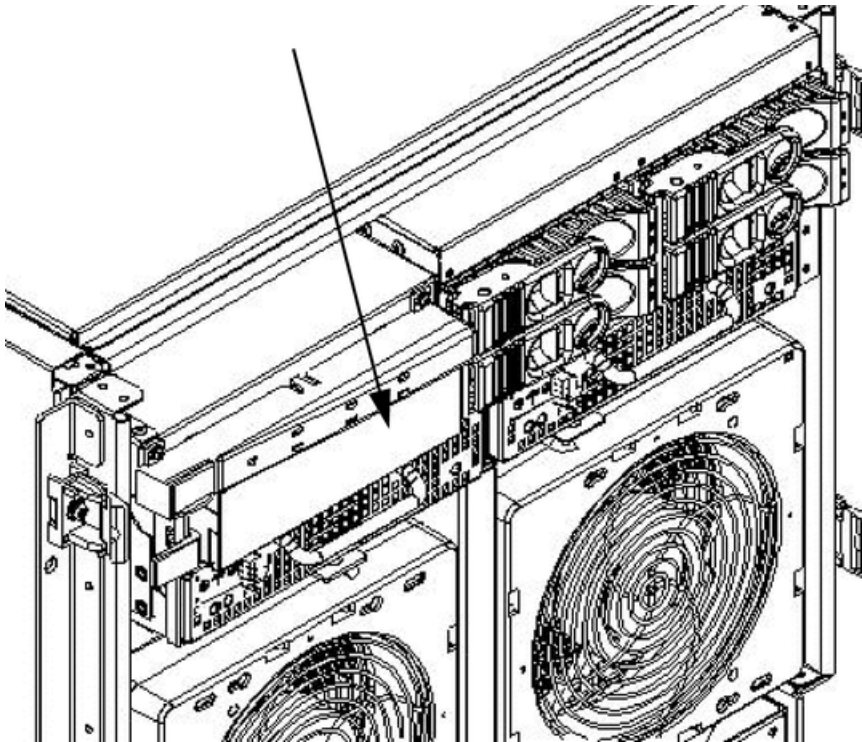
Removing and Replacing a CD/DVD/DAT Drive

The CD/DVD/DAT is located in the front of the chassis. You must remove system power to this component before attempting to remove or replace it. For more information, see “Powering Off Hardware Components and Powering On the Server” (page 84).



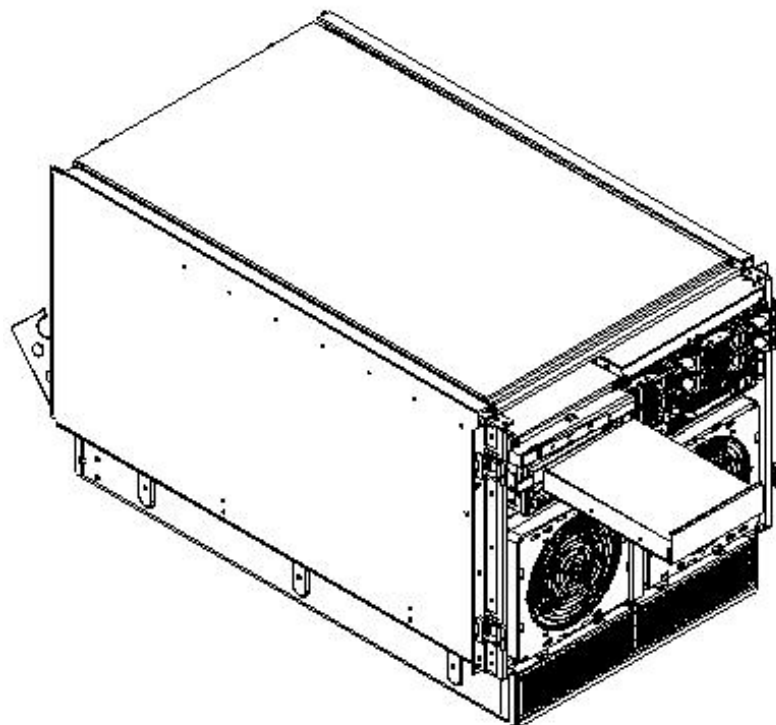
CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Figure 6-8 CD/DVD/DAT Location



Removing a CD/DVD/DAT Drive

Figure 6-9 CD/DVD/DAT Detail



To remove the CD/DVD/DAT, follow these steps:

1. To remove the CD/DVD/DAT, depress the front locking latch to release the drive from the chassis.
2. To disconnect the cables from the rear of the CD/DVD/DAT, slide the drive far enough from the chassis.
3. Slide the drive completely out of the chassis.
4. Remove the rails and clips from the drive.

Replacing a CD/DVD/DAT Drive

To replace the CD/DVD/DAT, follow these steps:

CAUTION: Before attempting to install the drive into the chassis, position the data cable over the top of the drive to avoid pinching the cable during installation.

1. Attach the rails and clips to the drive.
2. Partially slide the drive into the chassis and connect the cables to the rear of the CD/DVD/DAT.
3. Fully slide the drive into the chassis. The drive easily slides into the chassis.
4. To properly seat the drive, use a slow, firm pressure until the release latch locks.

Removing and Replacing a Front Smart Fan Assembly

The front smart fan assembly is located in the front of the chassis. The fan assembly is a hot swappable component.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Figure 6-10 Front Smart Fan Assembly Locations

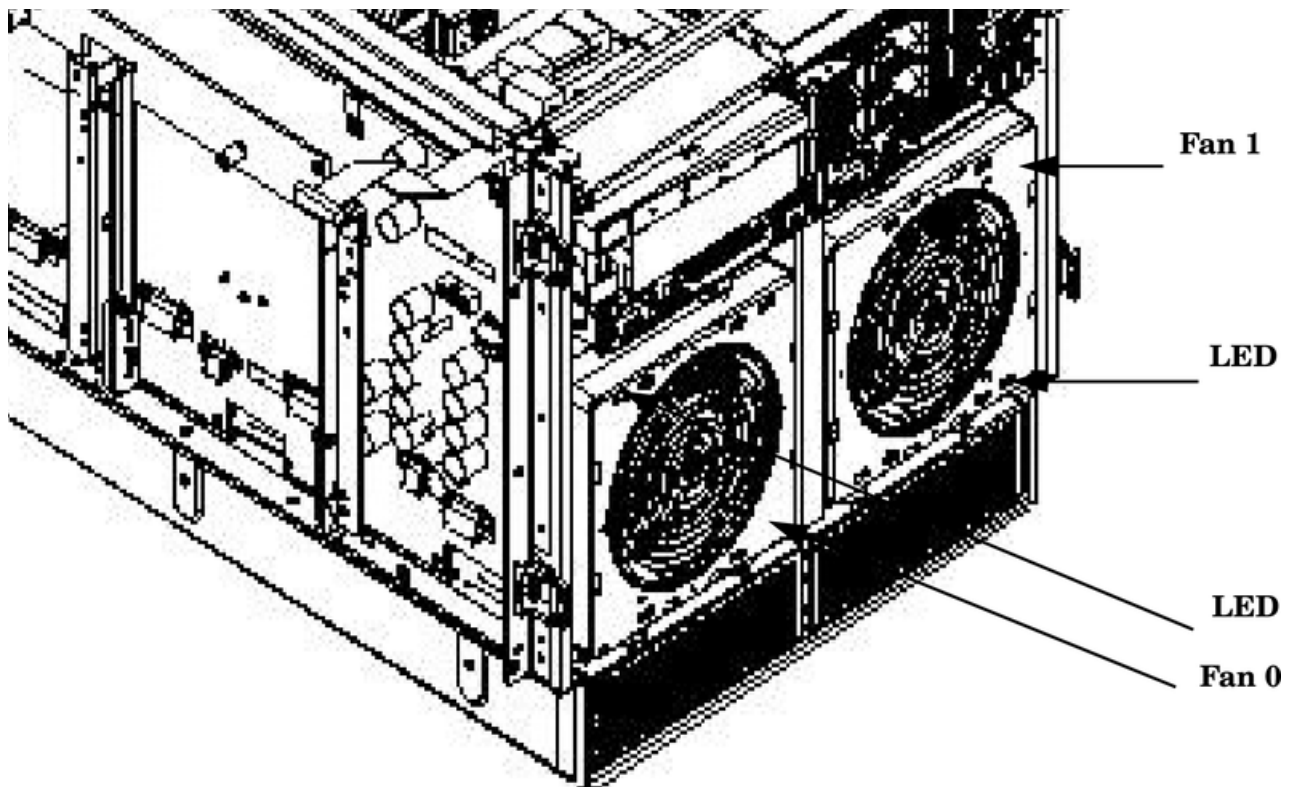
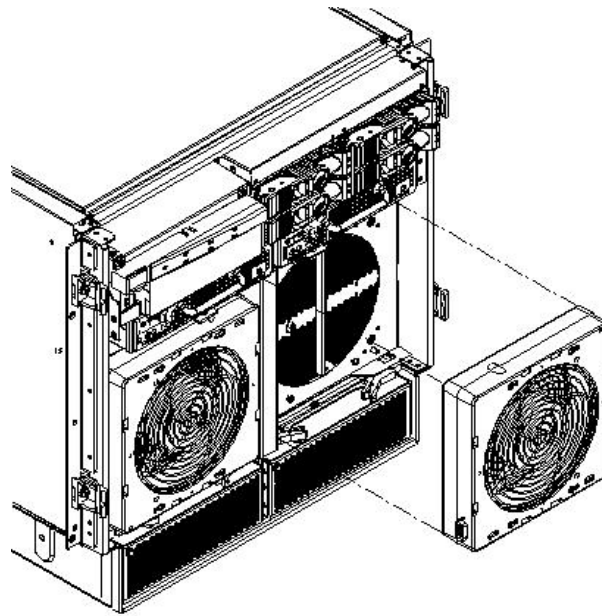


Table 6-1 Front Smart Fan Assembly LED Indications

LED State	Description
On Green	Fan is at speed and in sync or not at speed less than six seconds
Flashing Yellow	Fan is not keeping up with speed/sync pulse for greater than six seconds
Flashing Red	Fan failed or stalled or has run slow or fast for greater than six seconds
Off	Fan is not installed or no power is applied to fan

Removing a Front Smart Fan Assembly

Figure 6-11 Front Fan Detail



To remove a front smart fan assembly, follow these steps:

1. Remove the front bezel.
2. Push the fan release pin away from the fan.
3. Slide the fan away from the connector.
4. Pull the fan away from the chassis.

Replacing a Front Smart Fan Assembly

To replace a front smart fan assembly, follow these steps:

1. Position the fan assembly on the chassis fan guide pins.
2. Slide the fan into the connector.
3. Verify that the fan release pin is in the locked position.
4. Replace the front bezel.



NOTE: A green LED indicates the fan is operational.

Removing and Replacing a Rear Smart Fan Assembly

The rear smart fan assembly is located in the rear of the chassis. The fan assembly is a hot-swappable component.



CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Figure 6-12 Rear Smart Fan Assembly Locations

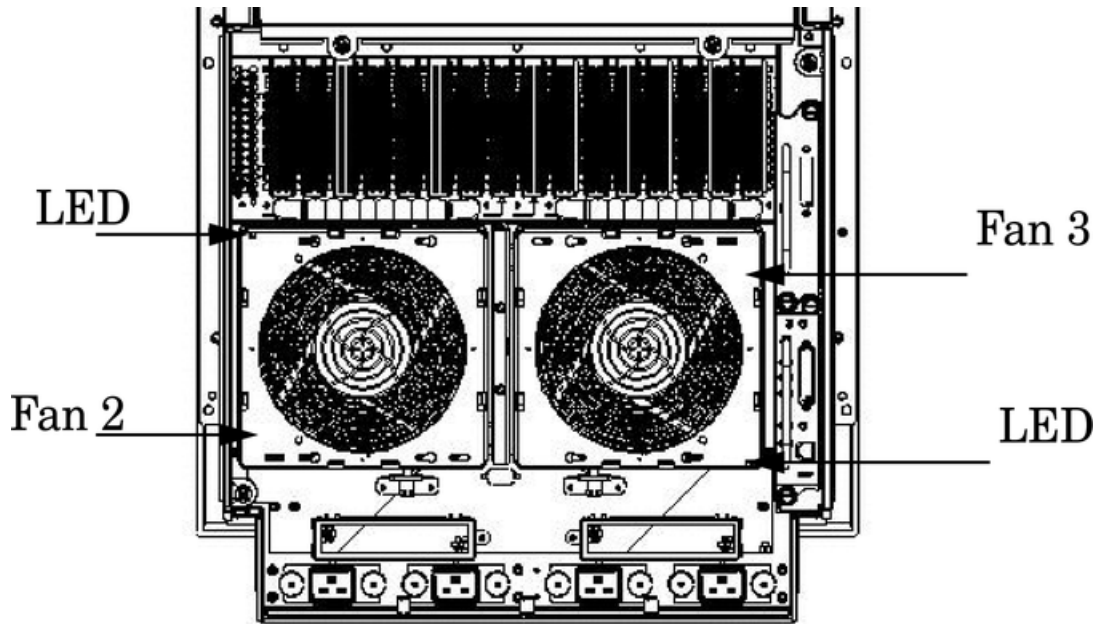
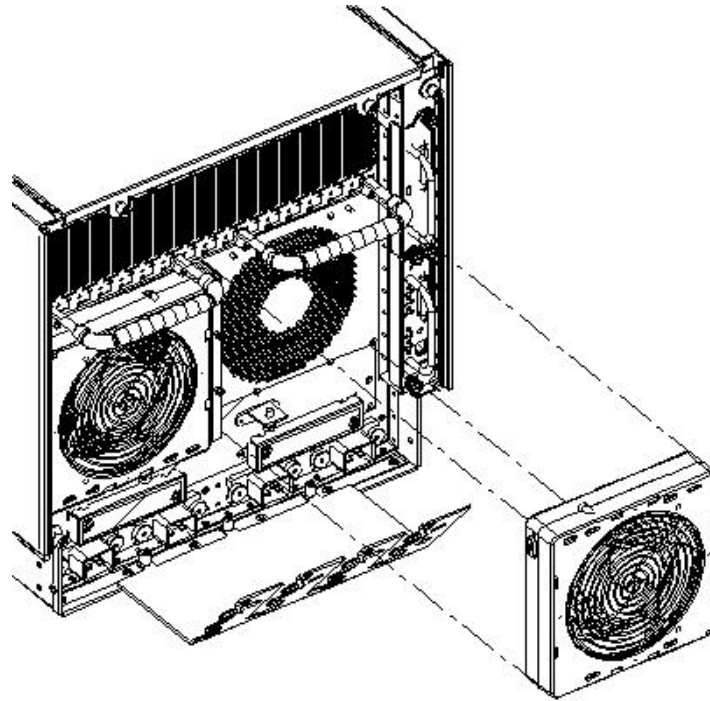


Table 6-2 Rear Smart Fan Assembly LED Indications

LED State	Description
On Green	Fan is at speed and in sync or not at speed less than six seconds
Flashing Yellow	Fan is not keeping up with speed/sync pulse for greater than six seconds
Flashing Red	Fan failed or stalled or has run slow or fast for greater than six seconds
Off	Fan is not installed or no power is applied to fan

Removing a Rear Smart Fan Assembly

Figure 6-13 Rear Fan Detail



To remove a smart fan assembly, follow these steps:

1. Push the fan release pin away from the fan.
2. Slide the fan away from the connector.
3. Pull the fan away from the chassis.

Replacing a Rear Smart Fan Assembly

To replace a smart fan assembly, follow these steps:

1. Carefully position the fan assembly on the chassis fan guide pins.
2. Slide the fan into the connector.
3. Verify that the fan release pin is in the locked position.



NOTE: A green fan LED indicates the fan is operational.

Removing and Replacing a PCI-X Smart Fan Assembly

The PCI-X smart fan assembly is located at the front of the PCI card cage, toward the middle top portion of the server. The fan assembly is a hot swappable component.



CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Figure 6-14 PCI-X Smart Fan Assembly Location

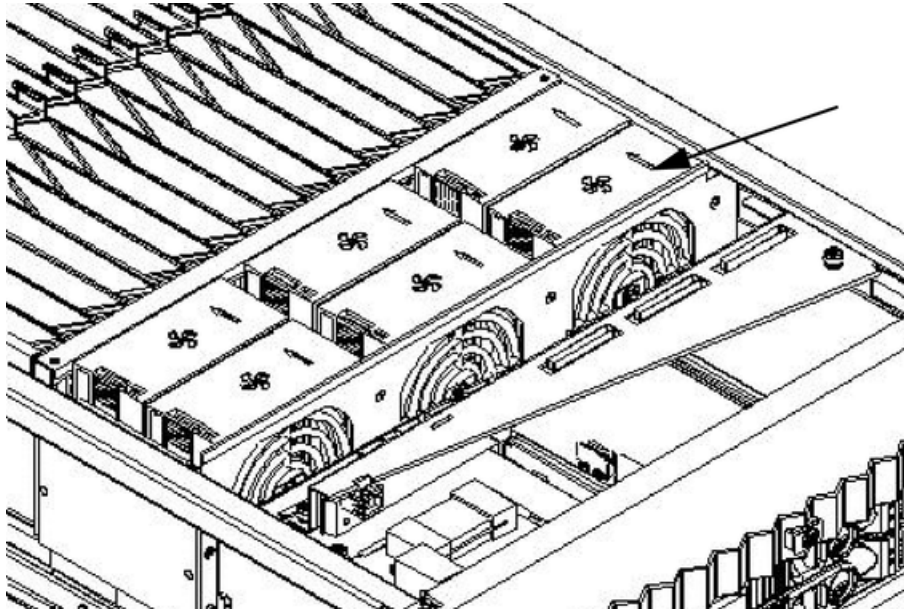
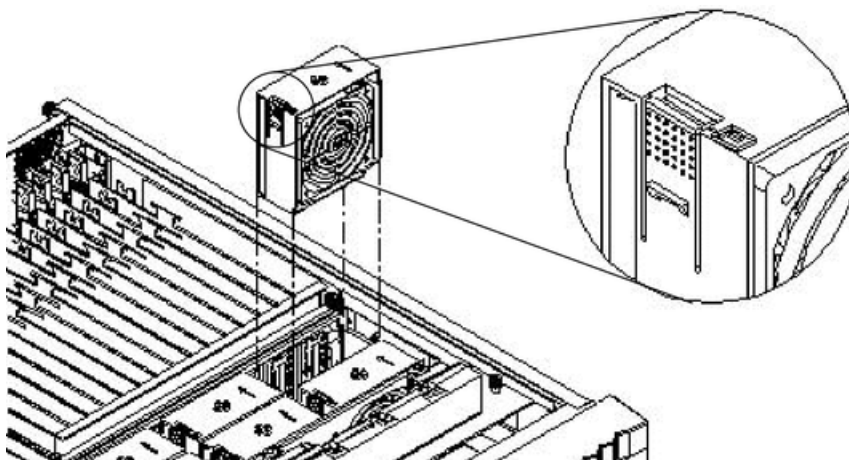


Table 6-3 Smart Fan Assembly LED Indications

LED State	Description
On Green	Fan is at speed and in sync or not at speed less than six seconds
Flashing Yellow	Fan is not keeping up with speed/sync pulse for greater than six seconds
Flashing Red	Fan failed or stalled or has run slow or fast for greater than six seconds
Off	Fan is not installed or no power is applied to fan

Removing a PCI-X Smart Fan Assembly

Figure 6-15 PCI-X Smart Fan Assembly Detail



To remove a PCI-X smart fan assembly, follow these steps:

1. Remove the top cover.

2. Grasp the fan with thumb and forefinger while depressing the locking tab.



NOTE: The two right side fans, as viewed from the front, are located very close to the chassis. It might be necessary to use a tool, such as a flat blade screwdriver, to assist in removing them.

3. Slide the fan upward from the chassis.

Replacing a PCI-X Smart Fan Assembly

To replace a PCI-X smart fan assembly, follow these steps:

1. Carefully position the fan assembly in the chassis. The fan easily slides into the chassis.
2. To properly seat the connection, use a slow, firm pressure.
3. Replace the top cover.



NOTE: A green fan LED indicates the fan is operational.

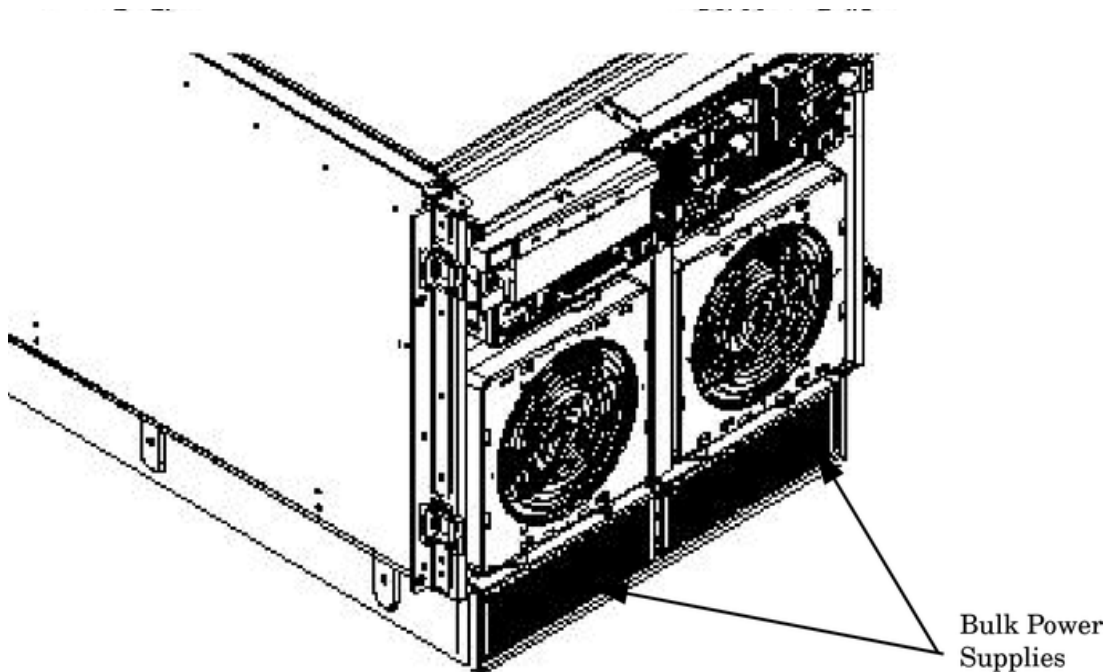
Removing and Replacing a Bulk Power Supply

The bulk power supply (BPS) is located in the front of the chassis. The BPS is a hot swappable component.



CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Figure 6-16 BPS Location

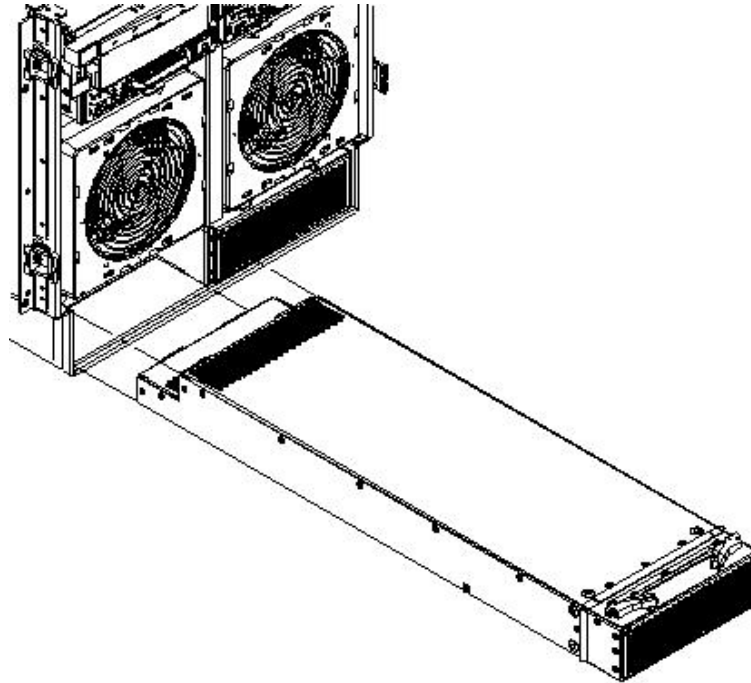




IMPORTANT: When a BPS is pulled from the server and then immediately re-inserted, the server might report an overcurrent condition and shut down.

Removing a BPS

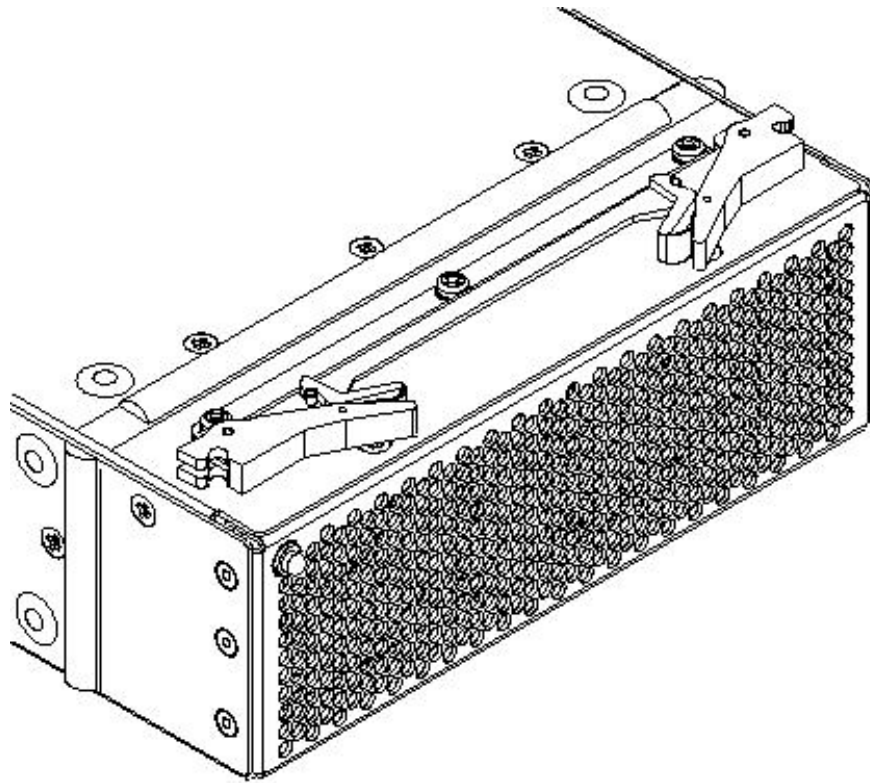
Figure 6-17 BPS Detail



To remove a BPS, follow these steps:

1. Remove the front bezel.
2. Pull the extraction levers located on the upper front outer portion of the BPS.

Figure 6-18 Extraction Levers



3. Slide the BPS forward using the extraction levers to remove it from the chassis.

CAUTION: Use caution when handling the BPS. A BPS weighs 18 lb.

Replacing a BPS

To replace a BPS, follow these steps:

1. Verify that the extraction levers are in the open position, then insert the BPS into the empty slot. The BPS easily slides into the chassis.
2. To properly seat the connection, use a slow, firm pressure.
3. Ensure the BPS has seated by closing the extraction levers.
4. Replace the front bezel.



NOTE: A green BPS LED indicates the BPS is operational.

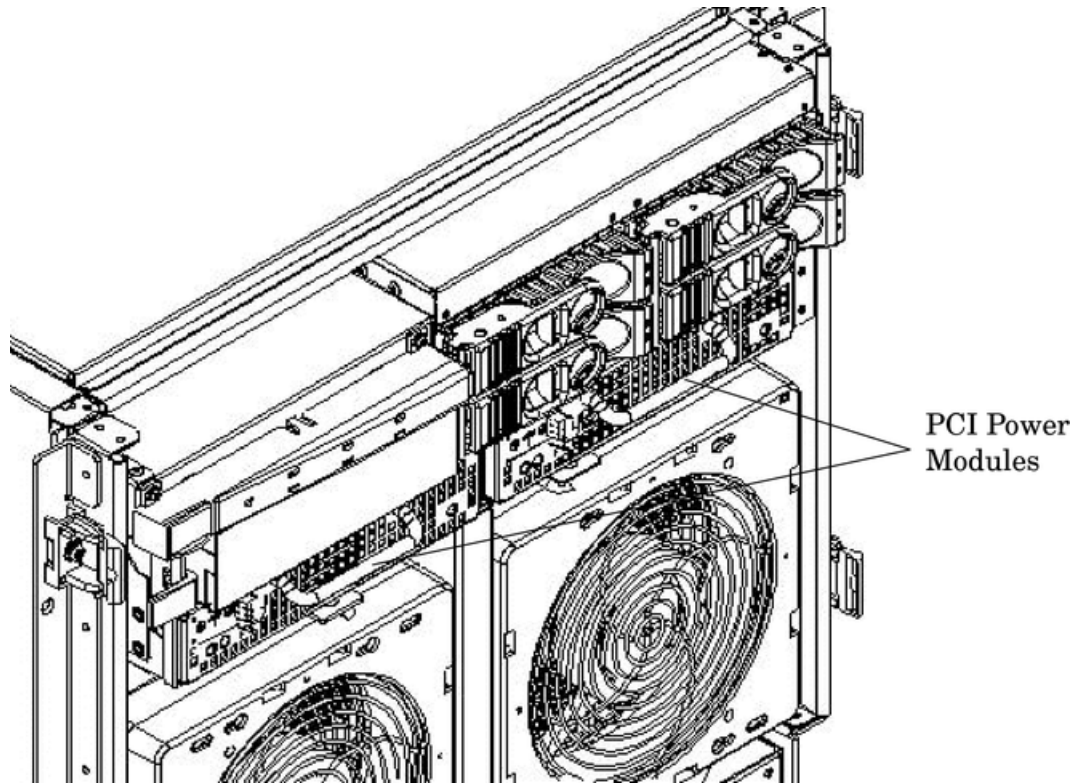
Removing and Replacing a PCI Power Module

The PCI power module is located in the front of the chassis. You must turn off system power to replace this CRU. See “Powering Off Hardware Components and Powering On the Server” (page 84).



CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Figure 6-19 PCI Power Module Location



Preliminary Procedures

1. Identify the failed power supply. For a description of the PCI Power Supply LED states, see Table 6-4.
2. Connect to ground with a wrist strap.
3. Visually inspect the replacement part for proper number and revision.
4. Shut down the partition and power off the PCI domain.
5. Remove the front bezel.

Table 6-4 PCI-X Power Supply LEDs

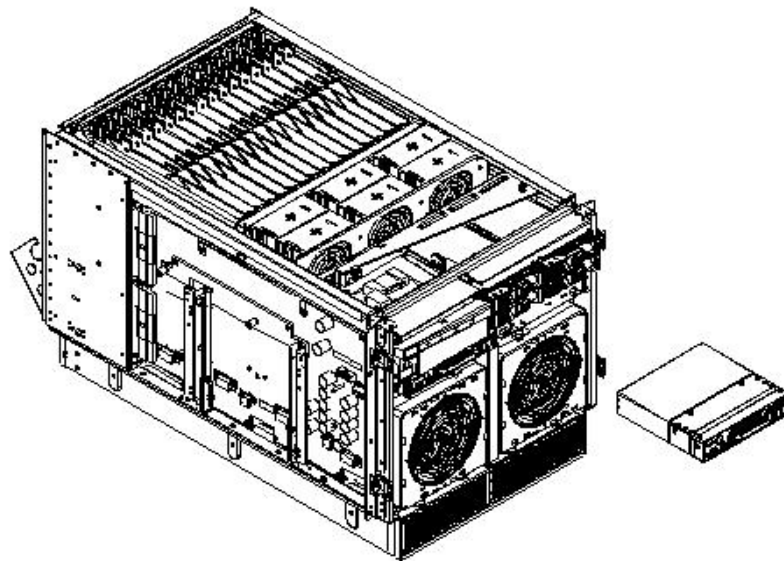
LED	Driven By	State	Description
Power	Each supply	On Green	All output voltages generated by the power supply are within limits.
		Off	Power to the entire system has been removed.
Attention	MP through PCI LPM	Yellow	For LED status in combination with the green power LED for PCI-X slot status, see Table 5-7 (page 75).

Table 6-4 PCI-X Power Supply LEDs (continued)

LED	Driven By	State	Description
Fault	Each supply	Flash Yellow	The temperature within the power supply is above the lower threshold.
		On Yellow	The temperature of the power supply is approaching the thermal limit
		Flash Red	Power supply has shut down due to an over temperature condition, a failure to regulate the power within expected limits, or a current-limit condition.
		Off	Normal operation.

Removing a PCI Power Module

Figure 6-20 PCI Power Module Detail



To remove a PCI power module, follow these steps:

1. Grasp the handle on the front of the power module.
2. Slide and hold the locking tab to the right and pull the PCI module from the chassis.

Replacing a PCI Power Module

To replace a PCI power module, follow these steps:

1. Slide the PCI power module into the chassis until the locking tab clicks and locks.
2. Power on the system. Use PE and PS commands to confirm success.
3. Note the status of power supply LEDs. The green LED should be on, and the fault LED should be off.

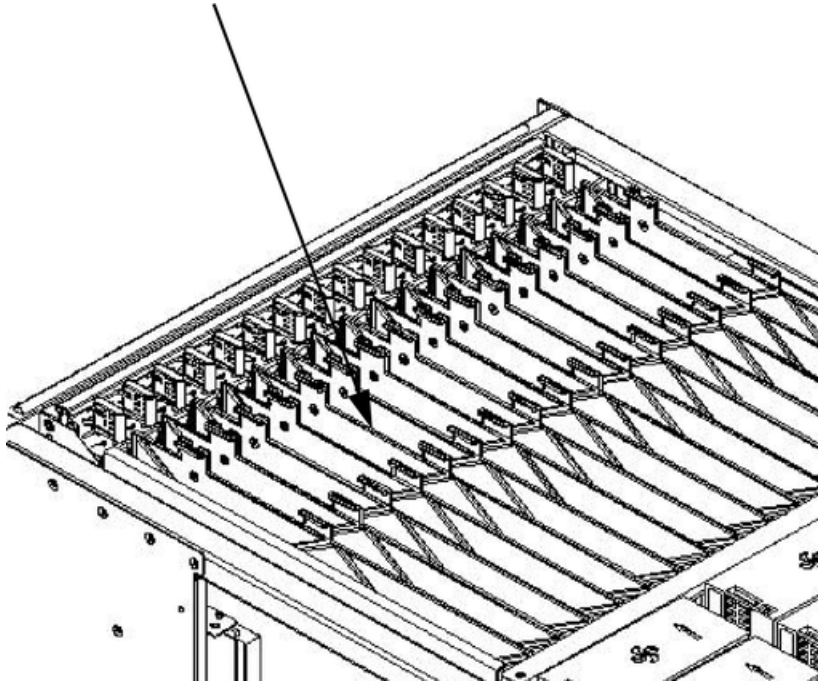
Removing and Replacing a PCI Card

The PCI cards are located in the rear of the chassis in the PCI card cage. PCI cards are hot-plug components. For a list and description of hot-pluggable CRUs, see “Hot-Pluggable CRUs” (page 83).



IMPORTANT: Complete information regarding OL* for I/O cards is on the HP website at <http://docs.hp.com>. Refer to the Interface Card OL* Support Guide for details. It is strongly recommended that you obtain a copy of this guide and refer to it before beginning the removal and replacement of PCI cards.

Figure 6-21 PCI Card Location



Removing the PCI Card

This procedure describes how to perform an online replacement of a PCI card using the attention button for cards whose drivers support online add or replacement (OLAR). The attention button is also referred to as the doorbell.



NOTE: HP 9000 rp7420 servers implement manual retention latch (MRL) hardware for use in online add or replacement (OLAR) operations. If an MRL is left open while the server is booting, HP-UX can incorrectly cache PCI slot power status causing OLAR operations to fail. To prevent this situation, ensure all the MRLs are closed before booting the server.

If OLAR reports that a slot is present and powered off, but no OLAR operations to turn power on to that slot have succeeded even after the MRL is closed, the MRL may have been left open during boot. To clear this condition, close the MRL for the PCI slot then power off the PCI slot using the `rad -o` command. This enables future OLAR operations to succeed on this PCI slot.

Prerequisites for this procedure are as follows:

- The card being replaced uses the same drivers and is the same type as the card being replaced.
- The green power LED is steady On.
- The yellow attention LED is steady Off or is blinking if a user has requested the slot location.
- To determine the status of all the PCI I/O slots, run the `olrad -q` command.



CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

To remove a PCI card, follow these steps:

1. Remove the top cover. See “Removing the Top Cover” (page 86).

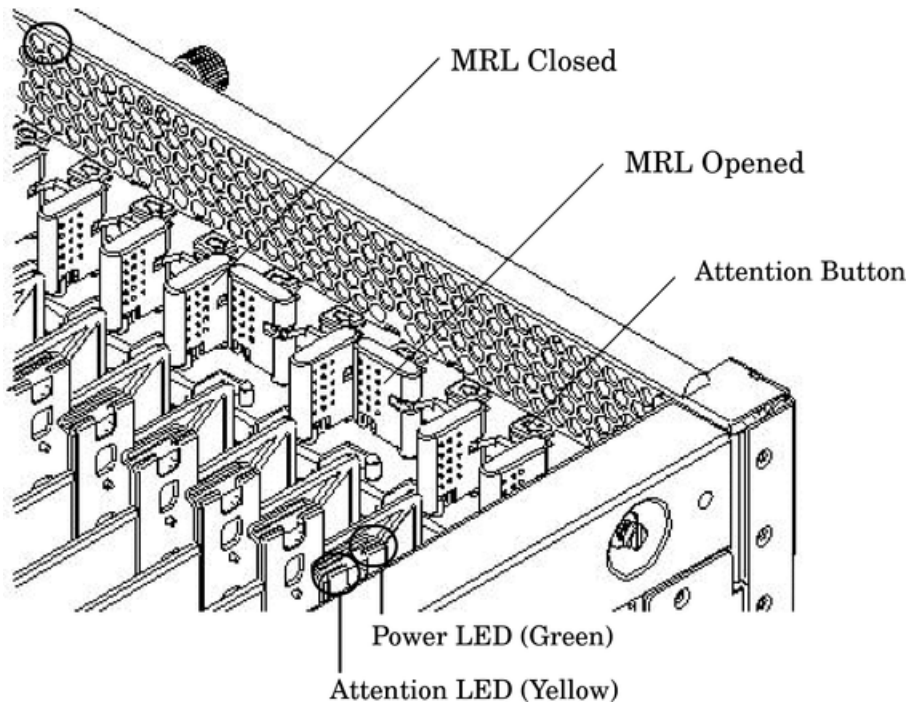
2. Press the attention button. See Figure 6-22.

The green power LED will start to blink and then turn steady Off. If the green power LED does not go Off, then check the `hotplugd` daemon log file (default: `/var/adm/hotplugd.log`) for errors, and do not proceed further.



NOTE: If the attention button is pressed a second time during the first five seconds while the green LED is blinking, the operation is cancelled and the power to the slot remains on.

Figure 6-22 PCI I/O Slot Details



3. Label and remove the cables connected to the PCI card to be removed.
4. Flip the PCI MRL for the card slot to the open position.
5. Firmly pull up on the tabs on the PCI card separator.
6. Remove the card from the PCI slot.

Replacing the PCI Card

To replace a PCI card, follow these steps:

1. Install the new replacement PCI card in the slot.



NOTE: Online addition using the attention button does not perform the pre-add sequence of `olrad` which uses the `olrad -a` command.

2. Flip the PCI MRL for the card slot to the closed position.
3. Press the attention button. The green power LED starts to blink.
4. Wait for the green power LED to stop blinking and turn solid green.
5. Check for errors in the `hotplugd` daemon log file (default: `/var/adm/hotplugd.log`).
6. Connect all cables to the replacement PCI card.
7. Replace the top cover. See “Replacing the Top Cover” (page 87).

The critical resource analysis (CRA) performed while doing an attention button initiated replace action is very restrictive and the action will not complete—it will fail—to protect critical resources from being impacted.

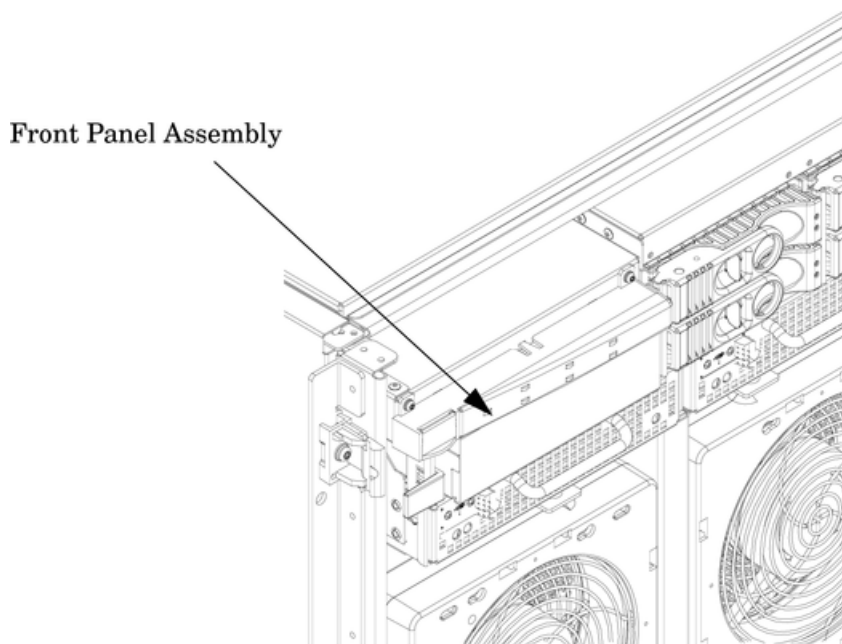
For finer control over CRA actions, use `pdweb` or the `olrad` command. See the *Interface Card OL* Support Guide* located on the HP website at <http://docs.hp.com> for details.

Removing and Replacing the PCA Front Panel Board

The front panel board is located in the front of the chassis. You must remove all system power before removing or replacing this component.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the server.

Figure 6-23 Front Panel Assembly Location



Removing the PCA Front Panel Board

To remove the PCA front panel board, follow these steps:

1. Follow proper procedures to power off the server.
2. Remove the front bezel and the top and left side covers.
3. Disconnect the DVD power cable from the mass storage backplane.
4. Disconnect the front panel cable from the system backplane.
5. Unscrew the captive fastener on the common tray cage cover. The cover has two ferrites with cables attached to it.
6. Slide the common tray cage cover to the rear and lift. Place the cable as far back as possible to enhance access to the front panel.
7. Remove the front panel bezel by removing the two M3 screws. After the screws are removed, press the tab in the center of the bezel to release the bezel.
8. Remove the two screws revealed upon removing the bezel.
9. Place your right hand on the PCA front panel cable near the entrance to the cavity. With your left hand, reach over the top of the chassis and by curling your fingers, reach into the cavity containing the PCA front panel.
10. The PCA front panel bracket has a small sheet metal wall that acts as a handle. This handle is located at the center of the height and width relative to the cavity.

Place your left hand under the handle and simultaneously, gently lift the handle upward and pull on the cable. This action disengages the tabs on the PCA front panel from the slots on the common tray cage.

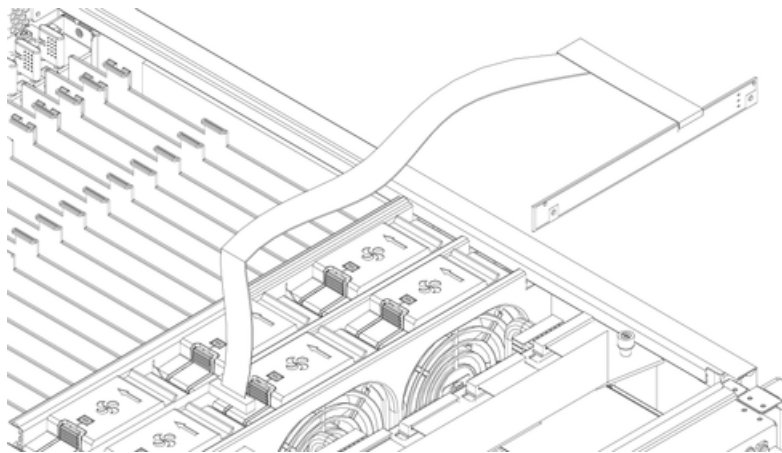
11. Gently pull the cable and handle toward the rear of the chassis until the steel power button that was initially protruding through the chassis clears the hole.
12. Rotate the top edge of the board toward you about 30 degrees by lifting on the handle with your left hand.
13. Angle the board such that the right side with the cable moves away from you and the opposite side with the power connector moves towards you.

Ensure that the power switch does not get stuck in one of the many holes in the front of the chassis. This rotation is best accomplished by gently pulling the cable with your right hand toward the rear of the cabinet.

14. Remove the cable end of the board first by gently pulling the cable with your right hand and adjusting the angle of the board with your left hand.

After the first tab on the board is outside the cavity, removal should proceed easily.

Figure 6-24 Front Panel Board Detail

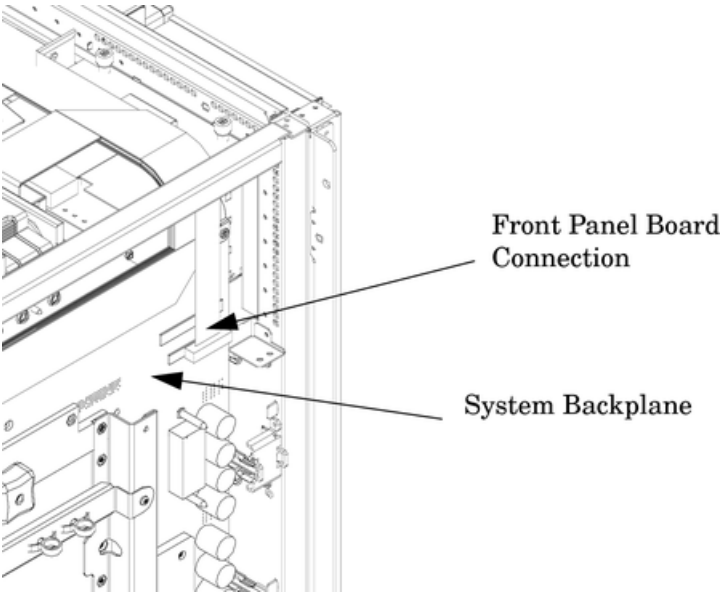


Replacing the Front Panel Board

To remove the PCA front panel board, follow these steps:

1. Slide the front panel into its slot from inside the server.
2. Angle the board so that the right side is at an angle.
Ensure that the power switch does not get caught in one of the many holes in the front of the chassis. Push the panel forward until the lock tabs click.
3. Attach the front panel bezel and tighten the two screws.
4. Replace the common tray cage cover.
5. Tighten the captive fastener on the common tray cage cover.
6. Attach the front panel cable to the system backplane.
7. Attach the DVD power cable.
8. Attach the data cable.
9. Replace the front bezel and the top and left side covers.
10. Follow proper procedures to power on the server.

Figure 6-25 Front Panel Board Cable Location on Backplane



A Parts Information

This appendix contains the HP 9000 rp7420 server CRU list.

Table A-1 Server CRU List

CRU Description	Replace Part Number	Exchange Part Number
CABLES		
Pwr Crd C19/unterminated interntl-Europe	8120-6895	N/A
Pwr Crd C19/IEC-309 L6-20 BLACK CA ASSY	8120-6897	N/A
Pwr Crd C19/GB 1002 4.5m BLACK CA ASSY	8120-0070	N/A
Pwr Crd C19/L6-20 4.5m BLACK CA ASSY	8120-6903	N/A
240 V N. American UPS 4.5m C19/L	8120-8494	N/A
C19/C20, BLK, 4.5m - Jumper	8121-0806	N/A
C19/C20, BLK, 2.5m - Jumper	8121-0802	N/A
DISKS and REMOVABLE MEDIA		
Removable DVD Drive	A9879-67001	N/A
36 GB 15K RPM SCSI Disk (A9880A)	A9896-64001	A9896-69001
72 GB 15K RPM SCSI Disk (A9881A)	A9897-64001	A9897-69001
146 GB 10K RPM Disk (A9882A)	A9898-64001	A9898-69001
Removable DAT 40i (DDS4) Tape Drive	C5686-67204	C5686-69204
FANS		
Assy, Smart Fan (Front/Rear) qty 4	A6752-67029	N/A
PCI Smart Fan Assembly qty 6	A6752-67030	N/A
KITS		
Removable Media Rail Kit	A6752-67011	N/A
Side/Top Covers Kit (Graphite)	A7027-67001	N/A
MISCELLANEOUS		
AC Power Supply (qty 2)	0950-4173	A6752-69113
PCI Power Module (Brick)	0950-3819	A6093-69123
Assy, Bezel, No Nameplate (Graphite)	A7025-04001	N/A
Nameplate, rp7420 (Graphite)	A7025-40003	N/A
Box, DVD Filler (Carbon)	A6912-00014	N/A
AC Cord Retention Bracket	A6752-00123	N/A
Assy, Lift Handle, Right Panel	A6752-04048	N/A
Assy, Lift Handle, Left Panel	A6752-04045	N/A
TOOLS		
24" x 36" Static Mat (with ground strap)	A5201-68004	N/A

B System Specifications

This chapter describes the basic server configuration and its physical specifications and requirements.

Dimensions and Weights

This section provides dimensions and weights of the system components.

Table B-1 HP Integrity rx7620 server Dimensions and Weights

Dimension	Standalone	Packaged
Height	17.3 in / 43.9 cm	35.75 in / 90.8 cm
Width	17.5 in / 44.4 cm	28.0 in / 71.1 cm
Depth	30.0 in / 76.2 cm	28.38 in / 72.0 cm
Weight - Pounds (kilograms)	220 lb / 100 kg	N/A

The shipping box, pallet, ramp, and container adds approximately 50 lb to the total system weight. The size and number of miscellaneous pallets is determined by the equipment ordered.

Table B-2 HP Integrity rx7620 server Component Weights

Quantity	Description	Weight (lb/kg.)
1 or 2	Cell board	27.80 lb / 12.61 kg
1	System backplane	12 lb (estimate) / 5.44 kg (estimate)
1	PCI-X backplane	20.4 lb / 9.25 kg
2	Bulk power supply	18 lb / 8.2 kg
1	Mass storage backplane	1 lb / 0.45 kg
2	PCI DC-to-DC converters	5 lb / 2.27 kg

Electrical Specifications

This section provides electrical specifications for HP Integrity rx7620 servers.

Grounding

The site building shall provide a safety ground for each AC service entrance to all cabinets.

Install a protective earthing (PE) conductor that is identical in size, insulation material, and thickness to the branch-circuit supply conductors. The PE conductor must be green with yellow stripes. The earthing conductor must be connected from the unit to the building installation earth or, if supplied by a separately derived system, at the supply transformer or motor-generator set grounding point.

AC-Powered Systems

Circuit Breaker

The Marked Electrical for the HP Integrity rx7620 server is 12 amps. The recommended circuit breaker size is 20 amps for North America. For countries outside North America, consult your local electrical authority having jurisdiction (LAHJ) for the recommended circuit breaker size.

The HP Integrity rx7620 server contains four C20 power receptacles located at the bottom rear bulkhead. A minimum of two power cords must be used to maintain normal operation of the HP Integrity rx7620 server. A second set of two cords can be added to improve system availability

by protecting, for example, against power source failures or accidentally tripped circuit breakers. The server can receive AC input from two different AC power sources.

System AC Power Specifications

Power Cords

Table B-3 lists the various power cables available for use with a HP Integrity rx7620 server. Each power cord is 15 feet (4.5 meters) in length with a IEC 60320-1 C19 female connector attached to one end.

Table B-3 Power Cords

Part Number	Description	Where Used
8120-6895	Stripped end, 240 volt	International-Other
8120-6897	Male IEC309, 240 volt	International-Europe
8121-0070	Male GB-1002, 240 volts	China
8120-6903	Male NEMA L6-20, 240 volt	North America/Japan

System Power Specifications

Table B-4 lists the AC power requirements for an HP Integrity rx7620 server. These tables provide information to help determine the amount of AC power needed for your computer room.

Table B-4 AC Power Specifications

Requirements	Value	Comments
Nominal input voltage	200/208/220/230/240 (VAC rms)	
Frequency range (minimum - maximum)	50 - 60 (Hz)	
Number of phases	1	
Maximum input current	12 amps	Per line cord
Maximum inrush current	30 A peak for 15 ms	Per line cord
Power factor correction	>0.98 >0.95	At all loads of 50% - 100% of supply rating At all loads of 25% - 50% of supply rating
Ground leakage current (mA)	<3.0 (ma)	Per line cord

Power Required (50 - 60 Hz)	Watts	VA	Comments
Maximum Theoretical Power	3156	3220	See #1 below
Marked Electrical Power	---	2640	12A @ 220 VAC, see note #2
Typical Maximum Power	1989	2030	See note #3



NOTE:

1. “Maximum theoretical power” is used to describe input power at the AC input. It is expressed in Watts and Volt-Amps to take into account power factor correction. The calculated sum is the maximum worst case power consumption for every subsystem in the server. This number will not be exceeded by a properly functioning server for any combination of hardware and software.
 2. “Marked electrical power” is the input power measured at the AC input expressed in Volt-Amps. The marked electrical power is the rating given on the chassis label and represents the input power required for facility AC power planning and wiring requirements. This number represents the expected maximum power consumption for the server based on the power rating of the bulk power supplies. This number can safely be used to size AC circuits and breakers for the system.
 3. “Typical maximum power” is the input power measured at the AC input expressed in Watts and Volt-Amps, and the measured maximum worst case power consumption. This number represents the largest power consumption for the server under laboratory conditions, using aggressive software applications designed specifically to work the system at maximum loads and power consumption.
-

DC-Powered Systems

DC-powered systems must be powered by a -48 VDC Telco power source. Follow your site-specific procedures for connecting the power and return lines to the server.

Environmental Specifications

This section provides the environmental, power dissipation, noise emission, and airflow specifications for HP Integrity rx7620 servers.

Temperature and Humidity

The cabinet is actively cooled using forced convection in a Class C1-modified environment.

Operating Environment

The system is designed to run continuously and meet reliability goals in an ambient temperature of 5° to 35° C at sea level. The maximum allowable temperature is derated 1° C per 1000 feet of elevation above 5000 feet above sea level up to 30° C at 10,000 feet. For optimum reliability and performance, the recommended operating range is 20° to 25° C

Environmental Temperature Sensor

To ensure that the system is operating within the published limits, the ambient operating temperature is measured using a sensor placed near the chassis inlet, between the cell boards. Data from the sensor is used to control the fan speed and to initiate system overtemp shutdown. (For more details see the platform management section.)

Non-Operating Environment

The system is designed to withstand ambient temperatures between -40° to 70° C under non-operating conditions.

Cooling

Cell Section Cooling

The cabinet incorporates front to back airflow across the cell boards and system backplane. Two 150 mm fans, mounted externally on the front chassis wall behind the cosmetic front bezel, push air into the cell section; and two 150 mm fans housed in cosmetic plastic fan carriers and mounted externally to the rear chassis wall, pull air through the cell section.

Each cell area fan cooling is controlled by a smart fan control board, embedded in the fan module plastic housing. The smart fan control board receives fan control input from the system fan controller on the system backplane and returns fan status information to the system fan controller. The smart fan control board also controls the power and the pulse width modulated control signal to the fan and monitors the speed indicator back from the fan. The fan status LED is driven by the smart fan control board.

Bulk Power Supply Cooling

Cooling for the bulk power supplies is provided by two 60 mm fans contained within each BPS. Air flows into the front of the BPS and is exhausted out of the top of the power supply through upward facing vents near the rear of the supply. The air is then ducted out of the rear of the chassis with minimal leakage into the cell airflow plenum.

PCI/Mass Storage Section Cooling

Six 92 mm fans located between the mass storage devices and the PCI card cage provide airflow through these devices. The PCI fans are powered with housekeeping power and run at full speed at all times. The air is pulled through the mass storage devices and pushed through the PCI Card Cage. Perforation is provided between the PCI bulkheads to allow adequate exhaust ventilation and to help reduce the localized airflow dead spots that typically occur at the faceplate tail of each PCI card.

Standby Cooling

Several components within the chassis consume significant amounts of power while the system is in standby mode. The system fans run at 1541 rpm, or 38% of full speed, during standby to remove the resulting heat from the cabinet. The fans within the power supply operate at full speed during standby.

Typical Power Dissipation and Cooling

Table B-5 Typical HP Integrity rx7620 server Configurations

Cell Boards	Memory Per Cell Board	PCI Cards (assumes 10 watts each)	DVDs	Hard Disk Drives	Core I/O	Bulk Power Supplies	Typical Power	Typical Cooling
Qty	GBytes	Qty	Qty	Qty	Qty	Qty	Watts	BTU/hr
2	16	16	2	4	2	2	2030	6930.42
2	8	8	0	2	2	2	1733	5916.46
2	4	8	0	2	2	2	1678	5728.69
1	4	8	0	1	1	2	1047	3574.46

The air conditioning data is derived using the following equations.

- Watts x (0.860) = kcal/hour
- Watts x (3.414) = Btu/hour
- Btu/hour divided by 12,000 = tons of refrigeration required



NOTE: When determining power requirements you must consider any peripheral equipment that will be installed during initial installation or as a later update. See the applicable documentation for such devices to determine the power and air-conditioning that is required to support these devices.

Acoustic Noise Specification

The acoustic noise specification for the HP Integrity rx7620 server is 57.3 db (sound pressure level at bystander position) It is appropriate for dedicated computer room environments but not office environments. The LwA is 7.5 Bels. Be sure to understand the acoustic noise specifications

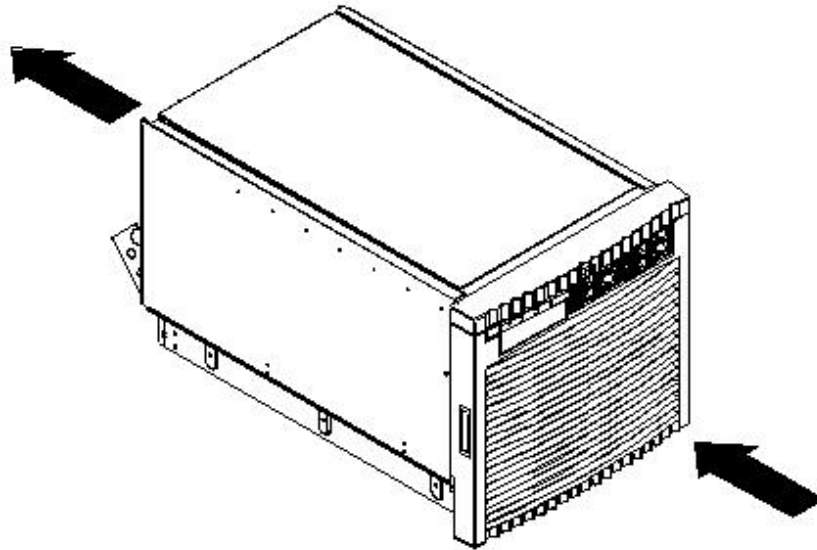
relative to operator positions within the computer room or when adding servers to computer rooms with existing noise sources.

Airflow

The HP Integrity rx7620 server requires that the cabinet air intake temperature be between 68° and 77° F (20° and 25° C) at 960 CFM.

Figure B-1 illustrates the location of the inlet and outlet airducts on a single cabinet.

Figure B-1 Airflow Diagram



System Requirements Summary

This section summarizes the requirements that must be considered in preparing the site for the HP Integrity rx7620 server.

Power Consumption and Air Conditioning

To determine the power consumed and the air conditioning required, follow the guidelines in Table B-5.



NOTE: When determining power requirements, consider any peripheral equipment that will be installed during initial installation or as a later update. See the applicable documentation for such devices to determine the power and air conditioning that is required to support these devices.

Maximum power is the sum of the worst case power consumption of every subsystem in the box and should be used to size worst case power consumption. Typical power consumption numbers are what HP engineers have measured when running power-intensive applications. These are generally lower than maximum power numbers, because it is uncommon for all of the subsystems in the box to draw maximum power for long periods of time.

Weight

To determine overall weight, follow the examples in Table B-6, then complete the entries in Table B-7.

Table B-6 Example Weight Summary

Component	Quantity	Multiply By	Weight
Cell Boards	2	27.80 lb / 12.61 kg	55.6 lb / 25.22 kg
PCI Card (varies - used A3739B here)	4	0.34 lb / 0.153 kg	1.36 lb / 0.61 kg
Power Supply (BPS)	2	18.0 lb / 8.2 kg	36 lb / 16.40 kg
DVD	1	2.2 lb / 1.0 kg	2.2 lb / 1.0 kg
Disk Drive	4	1.6 lb / 0.73 kg	6.40 lb / 2.90 kg
Chassis with skins and front bezel cover	1	131 lb / 59.42 kg	131 lb / 59.42 kg
		Total weight	244.56 lbs (111.75)

Table B-7 Weight Summary

Component	Quantity	Multiply By	Weight (kg)
Cell Boards		27.8 lb / 12.61 kg	
PCI Card		weight varies	
Power Supply (BPS)		18 lb / 8.2 kg	
DVD		2.2 lb / 1.0 kg	
Disk Drive		1.6 lb / 0.73 kg	
Chassis with skins and front bezel cover		131 lb / 59.42 kg	
		Total weight	

C MP Commands

This appendix contains a list of the Server Management Commands.

Server Management Commands

Table C-1 lists the server management commands.

Table C-1 Service Commands

Command	Description
BO	Boot a partition
DATE	Set the time and date
DF	Display FRU Information of an entity
MA	Return to Main Menu
PE	Power entities on or off
PWRGRD	Allows user to configure the power grid
RE	Reset entity
RR	Reset partition for reconfiguration
RS	Reset a partition
SYSREV	Returns all system revisions
TC	Send a TOC signal to a partition
TE	Broadcast a message to all users of the MP command handler
WHO	Display list of MP connected users
LOC	Display and Set Locator LED status

Table C-2 lists the server status commands

Table C-2 Status Commands

Command	Description
CP	Display partition cell assignments
DE	Display entity status
DU	Display devices on bus
HE	Display the list of available commands
LS	Display LAN connected console status
PS	Display detailed power and hardware configuration status

Table C-3 lists the server system and access config commands

Table C-3 System and Access Config Commands

Command	Description
CA	Only displays local rs232 parameters
CC	Initiate a Complex Configuration
UPS	Set parameters for ups monitoring via SNMP

Table C-3 System and Access Config Commands *(continued)*

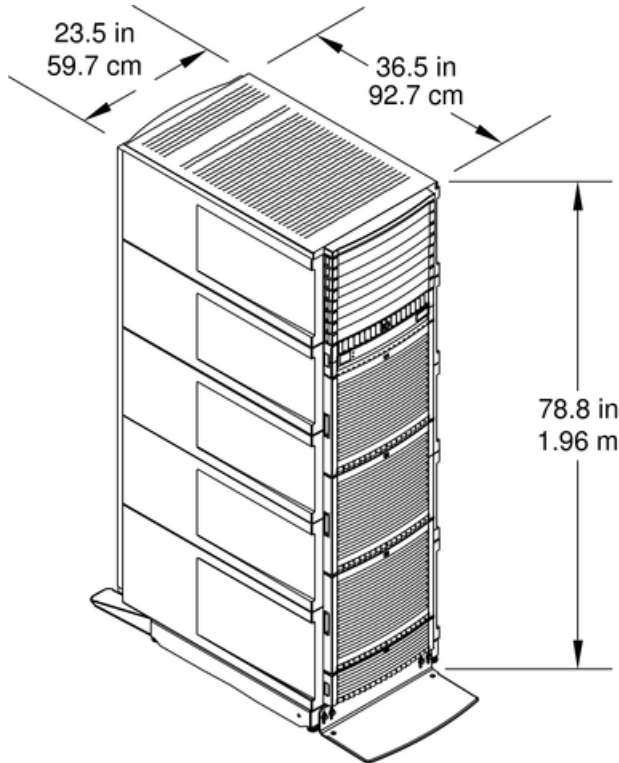
SNMP	Set SNMP daemon parameters
CP	Display partition cell assignments
DC	Reset parameters to default configuration
DI	Disconnect Remote or LAN console
ID	Change certain stable complex configuration profile fields
IF	Display network interface information
IT	Modify command interface inactivity time-out
LC	Configure LAN connections
LS	Display LAN connected console status
PARPERM	Enable/Disable Interpartition Security
PD	Modify default Partition for this login session
RL	Re-key complex profile lock
RU	Reset MP bus device
SA	Display and set MP remote access
SO	Configure security options and access control
XD	MP Diagnostic and reboot

D Site Preparation Guidelines

This appendix contains blank floor plan grids and equipment templates. Combine the necessary number of floor plan grid sheets to create a scaled version of the computer room floor plan.

Figure D-1 illustrates the overall dimensions required for an HP 9000 rp7420 server.

Figure D-1 Space Requirements



Equipment Footprint Templates

Equipment footprint templates are drawn to the same scale as the floor plan grid (1/4 inch = 1 foot). These templates show basic equipment dimensions and space requirements for servicing. The service areas shown on the template drawings are lightly shaded.

The equipment templates should be used with the floor plan grid to define the location of the equipment that will be installed in your computer room.



NOTE: Photocopying typically changes the scale of drawings copied. If any templates are copied, then all templates and floor plan grids must also be copied.

Computer Room Layout Plan

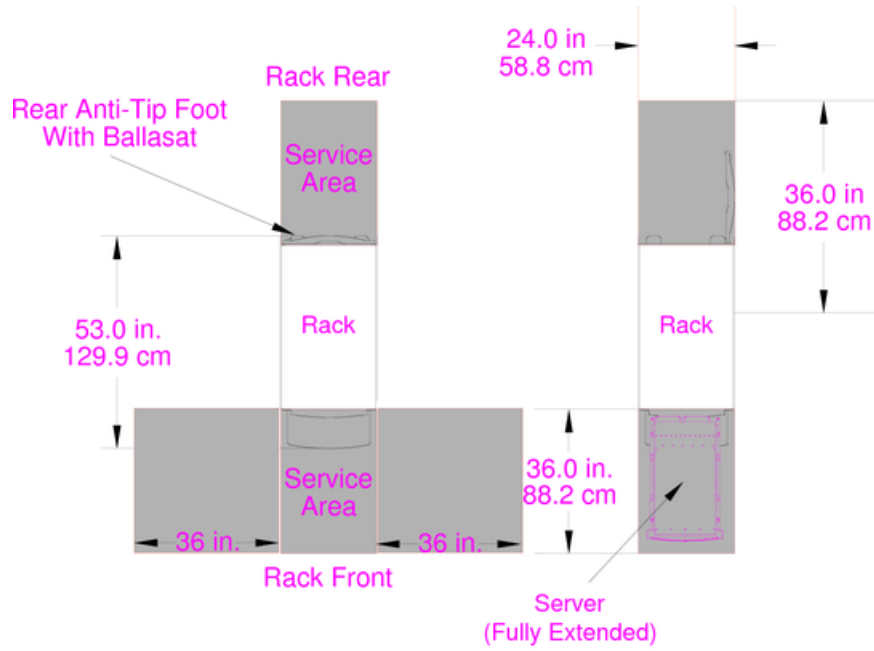
Use the following procedure to create a computer room layout plan:

1. Remove several copies of the floor plan grid.
2. Cut and join them together (as necessary) to create a scale model floor plan of your computer room.
3. Remove a copy of each applicable equipment footprint template.
4. Cut out each template selected in step 3; then place it on the floor plan grid created in step 2.
5. Position pieces until the desired layout is obtained; then fasten the pieces to the grid. Mark locations of computer room doors, air-conditioning floor vents, utility outlets, and so on.



NOTE: Attach a reduced copy of the completed floor plan to the site survey. HP installation specialists use this floor plan during equipment installation.

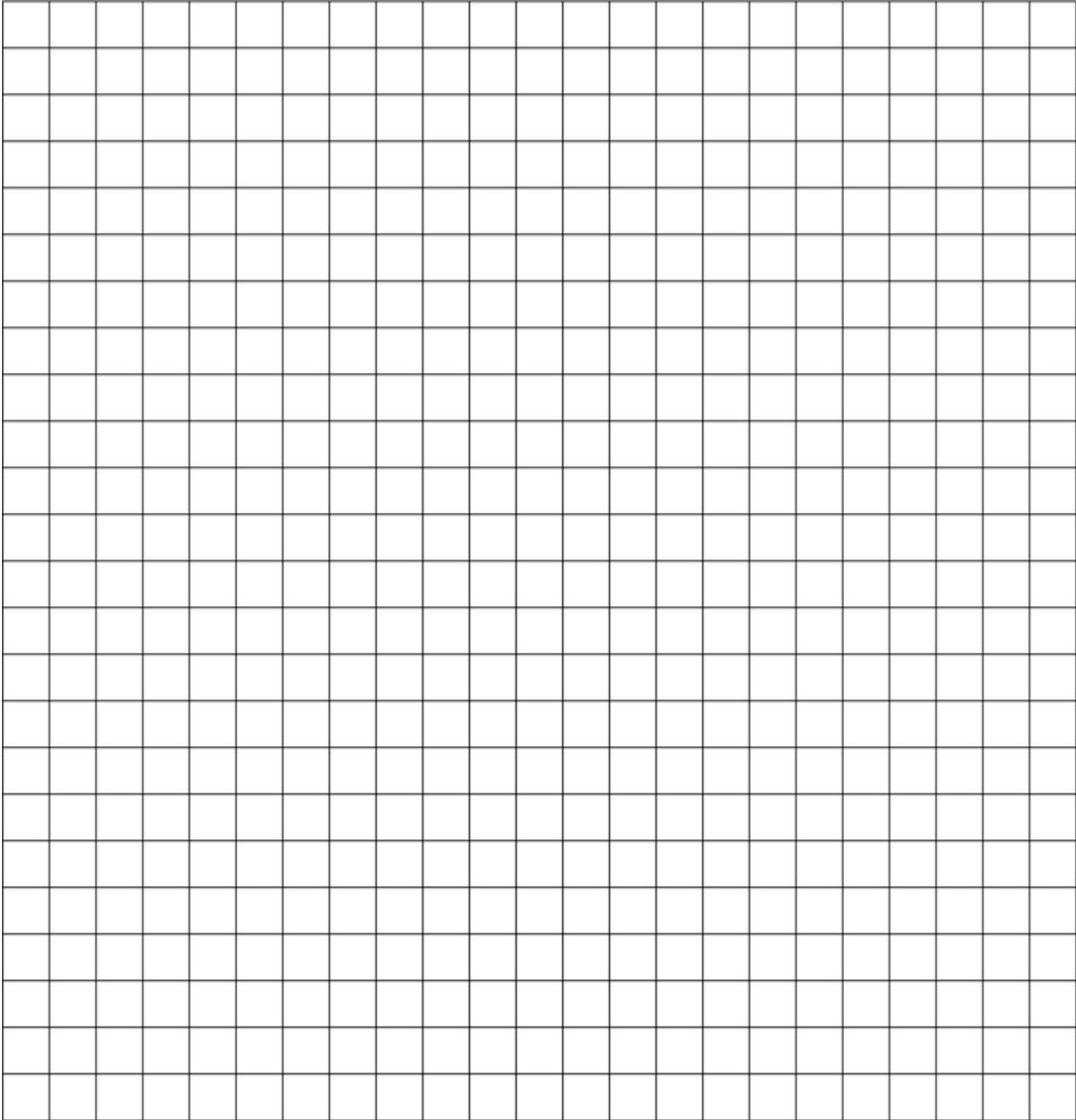
Figure D-2 Cabinet Template



Site_011
04/12/01

Figure D-3 Planning Grid

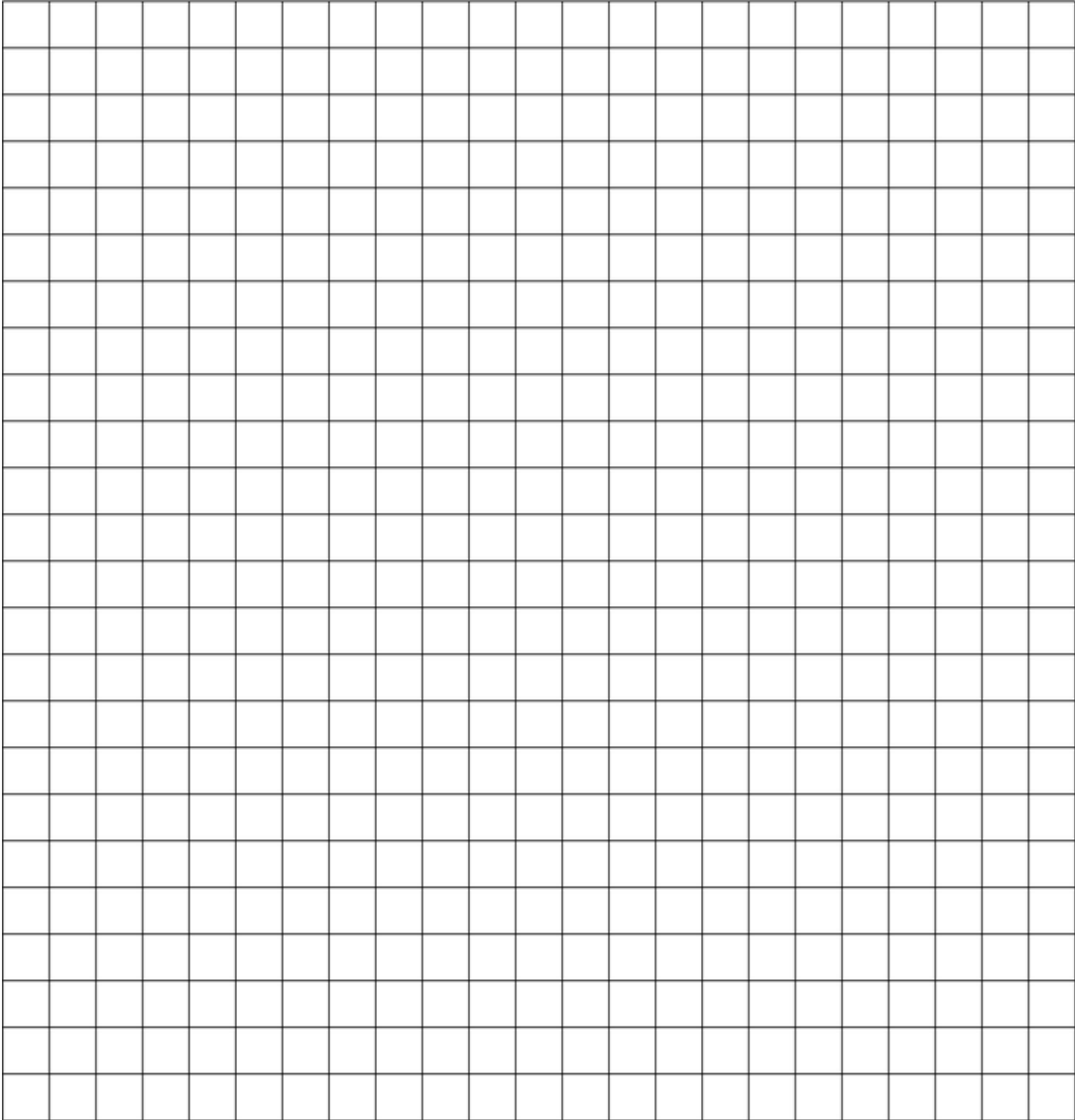
Scale: 1/4 inch = 1 foot



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12/20/99

Figure D-4 Planning Grid

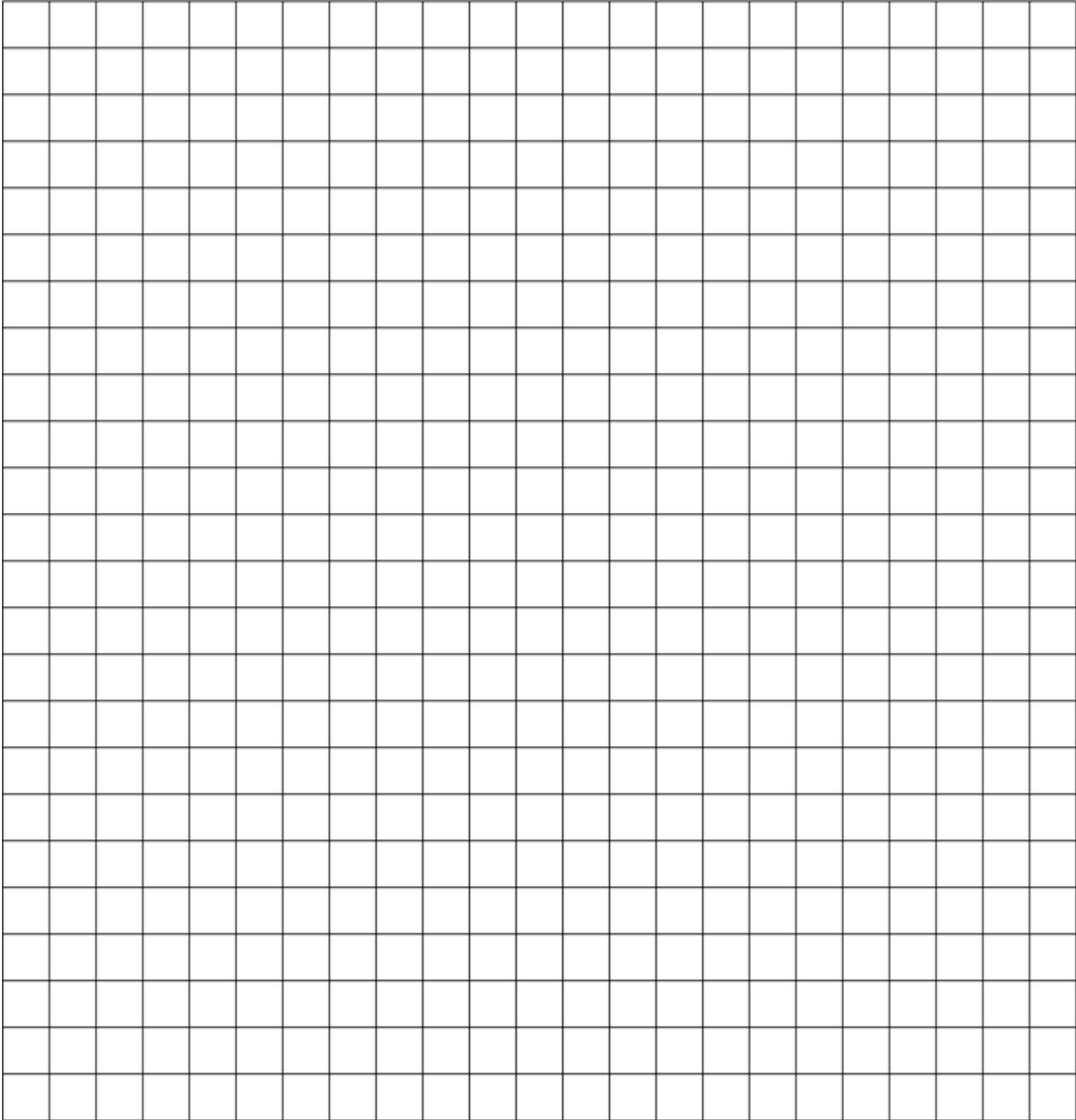
Scale: 1/4 inch = 1 foot



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Figure D-5 Planning Grid

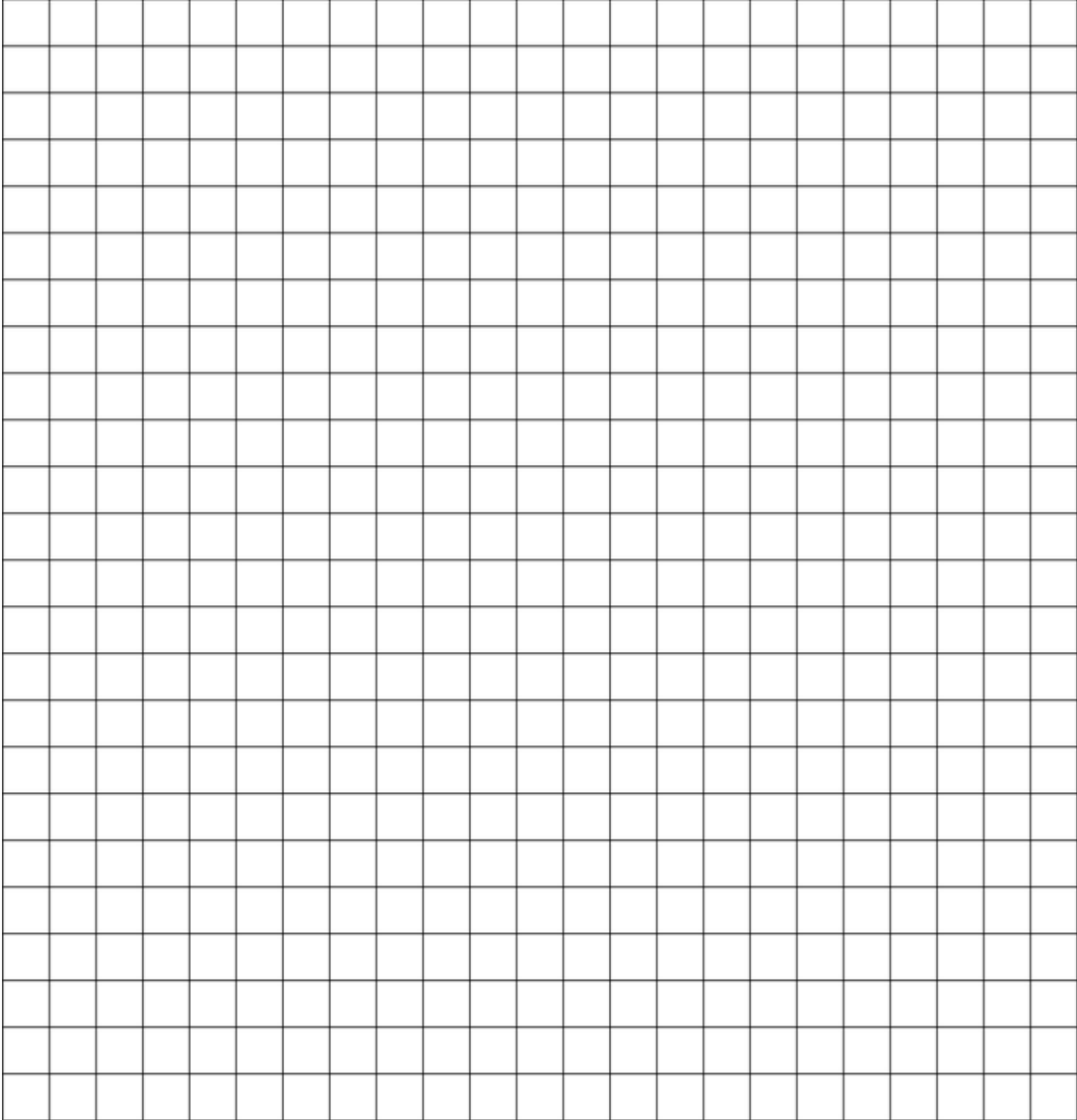
Scale: 1/4 inch = 1 foot



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Figure D-6 Planning Grid

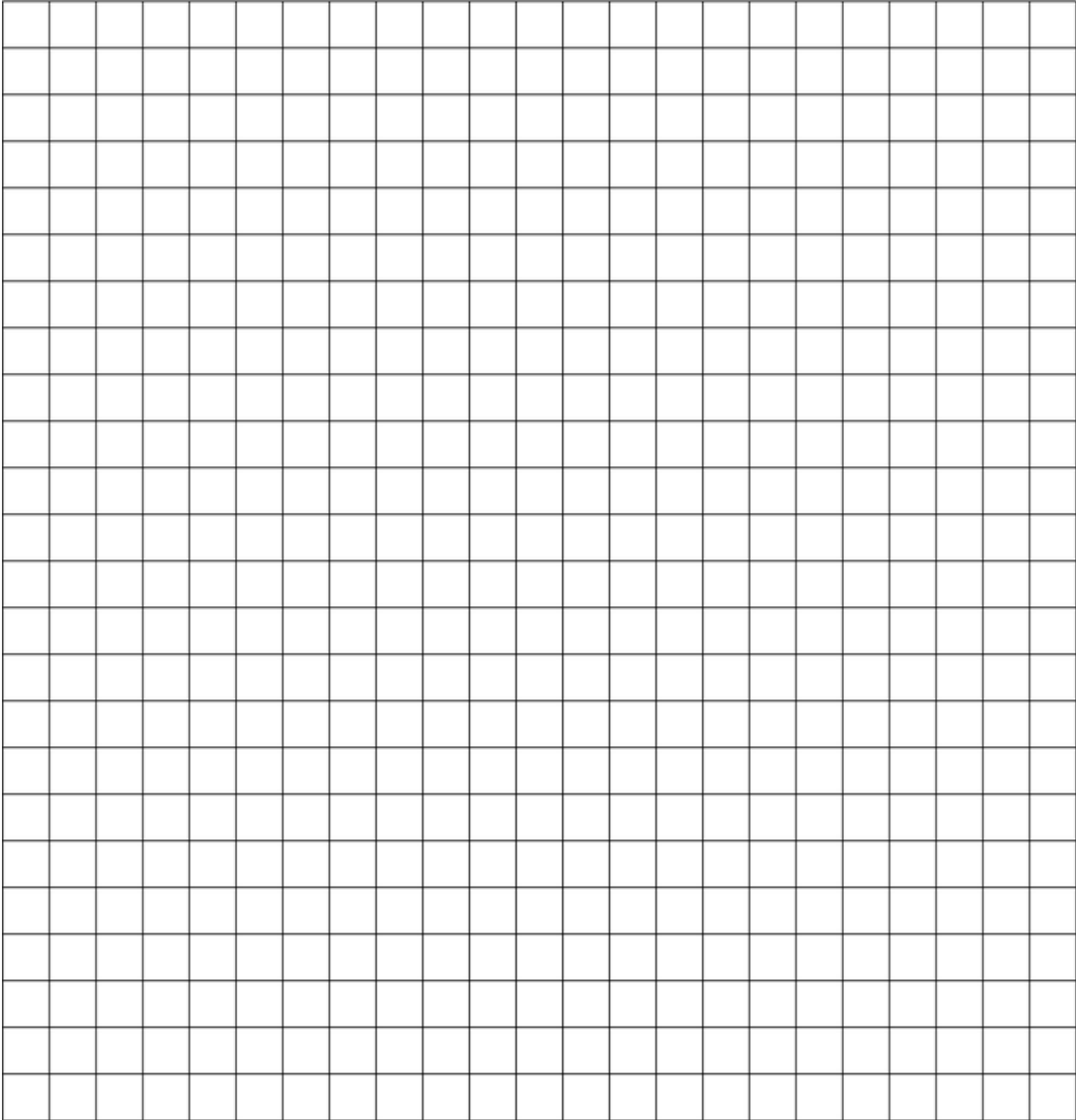
Scale: 1/4 inch = 1 foot



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Figure D-7 Planning Grid

Scale: 1/4 inch = 1 foot



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